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NATIONAL MUSEUM MELBOURNE

The Journal of the Department of Agriculture of Victoria, Australia.

February, 1923.

PRINCIPAL CONTENTS

Dairy Farming in Victoria

Crop and Fallow Competitions

Poultry Housing

Weeds and their Eradication

Potato Experiments

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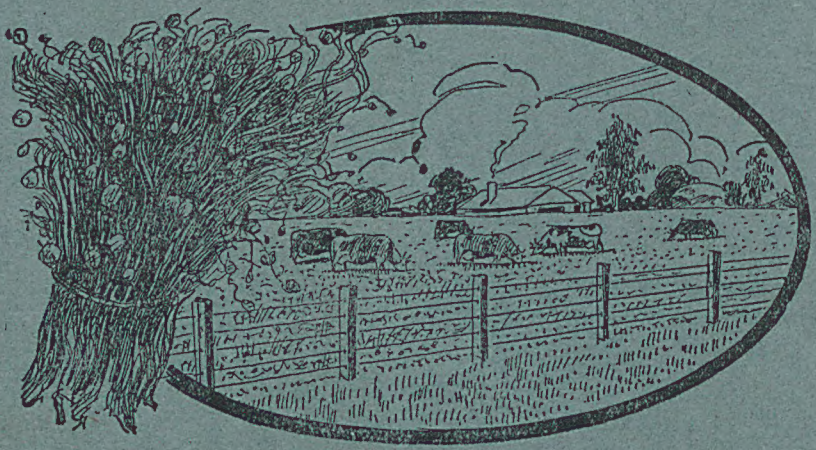

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THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

CONTENTS.—FEBRUARY, 1923.

		PAGE
Dairy Farming in Victoria	*J. S. McFadzean*	65
Shepparton Crop and Fallow Competition	*H. A. Mullett, B.Ag.Sc.*	82
Benalla Crop and Fallow Competition	*P. B. O'Keefe*	94
Housing Poultry	*W. C. Rugg*	99
Weeds and Their Eradication	*H. W. Davey, F.E.S.*	105
Potato Experiments, Werribee	*J. T. Ramsay*	110
Fruit Industry of Victoria	*E. Meeking*	115
Scientific Wheat-Growing—Results of Official Tests		117
Successful Sheep Farming		120
Pigs and Their Management		121
Lotus or Birds' Foot Trefoil		123
A Mule with a Foal		125
Orchard and Garden Notes		125
Reminders for March		127

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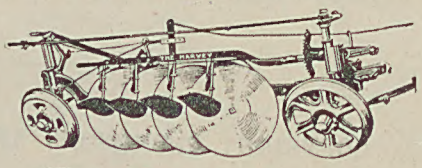

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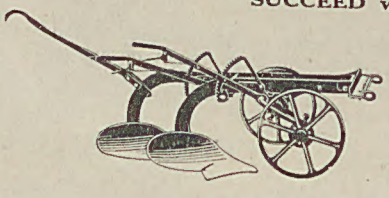

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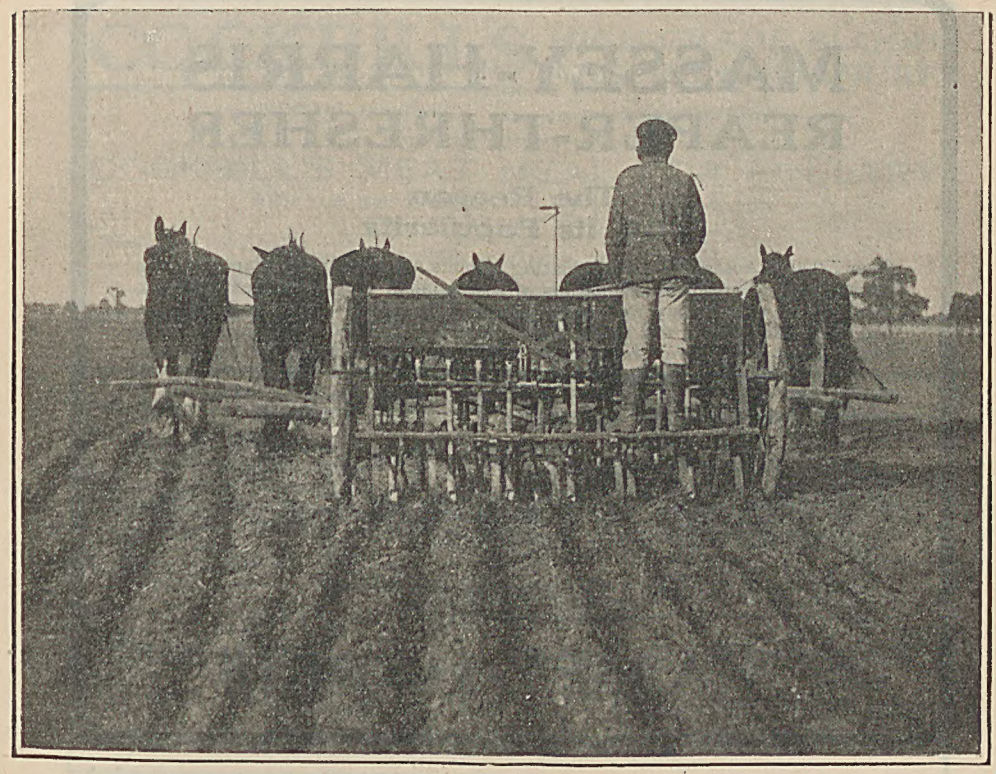

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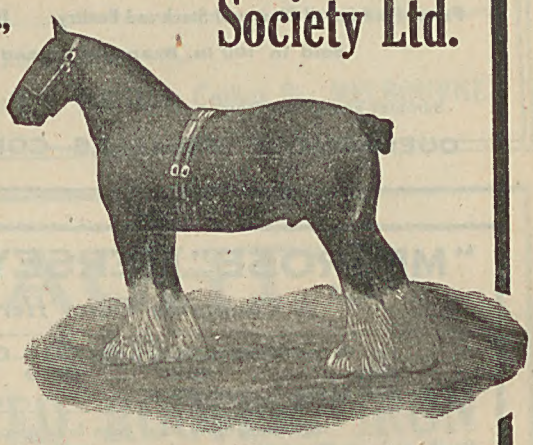

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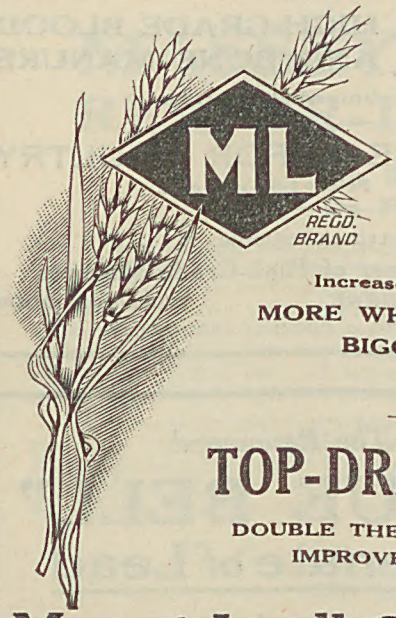

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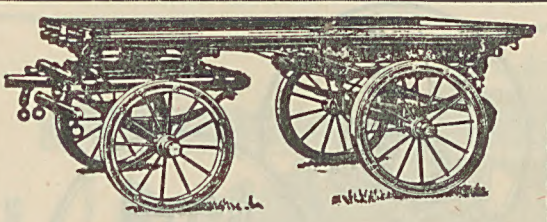

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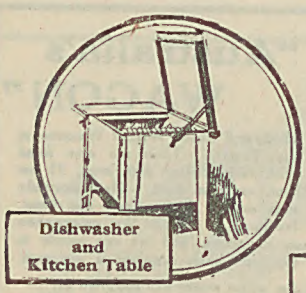

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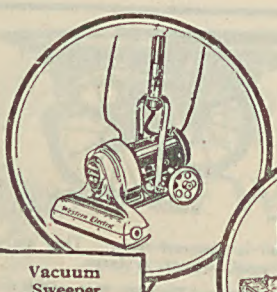

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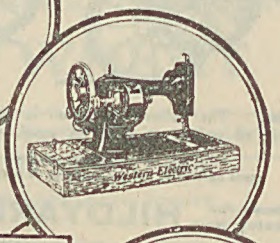

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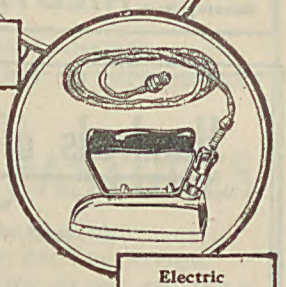

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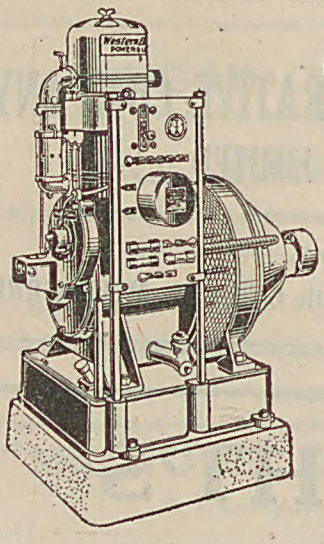

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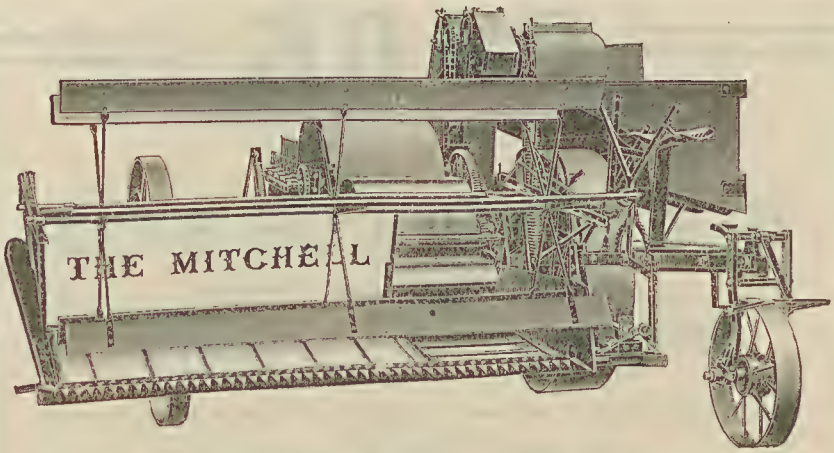

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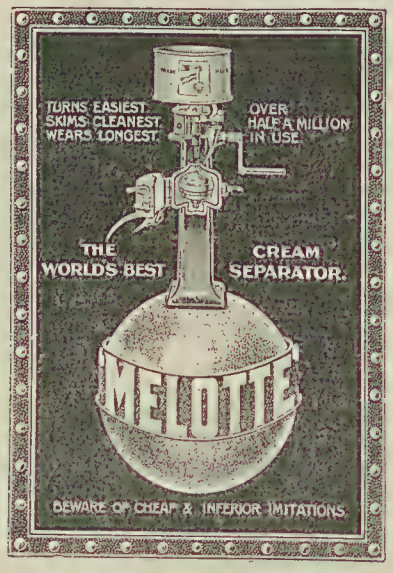

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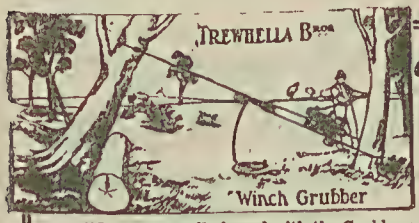

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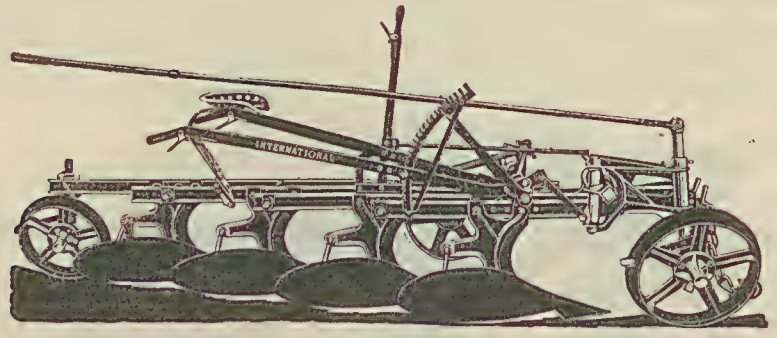

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DAIRY FARMING IN VICTORIA.

By J. S. McFadzean, Senior Dairy Supervisor.

SOME FACTS ABOUT THE INDUSTRY.

The time is fast approaching when the dairying industry will be definitely accorded its inevitable place as the most important branch of Victorian agriculture. Wool and wheat are mainly products of large land areas. Closer settlement and irrigation extensions are gradually subdividing the large areas of good land, and advanced knowledge in regard to dairy farm work is steadily increasing the acre production of land used in this line of farming. When properly carried on, dairy farming gives a much greater return in cash per acre than either wool or wheat; consequently, under increased settlement, dairying is ever superseding these other branches of agriculture.

So far as natural advantages are concerned, it is generally conceded that if there is any best country in the world for those engaging in the dairying business, most certainly it is the State of Victoria. Good climate, good water supply, and good soil are the essential local conditions which make for success in this industry, and all of these are co-existent over a large portion of the State. Certainly, the clearing of heavy timber, or the improvement of the existing water supply by irrigation channels or well sinking, has been necessary to complete the requirements on some blocks after subdivision has taken place; but in such cases, not only has the climate and quality of the soil warranted the work, but the results obtained have demonstrated the soundness of the proposition. Indeed, so well adapted are some Victorian districts for dairying farming that this business is carried on by many farmers by milking their cattle on pasture alone, and without any fodder growing or hand-feeding of any kind.

If care is taken not to overstock the land and to have sufficient paddocks on the farm to hold some surplus grass in reserve against a season unfavourable to growth, there are many places where dairying

may be profitably carried on under this method. However, there is no question that even in the most favoured localities it is possible to greatly increase the production of the dairy herds by systematic hand-feeding; for, with a regular and abundant supply of silage or other succulent fodder at hand, the cows may be held to their full possible productiveness, despite any unfavorable seasonable changes. Under the average existent local conditions dairying can be and should be made more highly profitable here than in any other country.

In regard to the handling of dairy produce direct from the farms, a glance at the Victorian railway map on page 67, whereon the factories and creameries now working are marked, it will be recognised that conveniences for carriage and treatment of dairy farm products are both numerous and very widely distributed. Possibly nothing is so good that it cannot be improved on, and further development both as to railways and factories is continually taking place, but even now there are comparatively few parts of the State where the farmer has to travel any great distance to dispose of his dairy produce. Further, to those unacquainted with the natural resources of the State, this map is a striking illustration of the extent to which dairying has become an established industry. Each of those factories and creameries is owned by either proprietary or co-operative companies, and represents a centre where it was evidently a payable proposition to establish such a depôt.

At present the annual value of the dairying industry in Victoria is represented by over seven million pounds sterling, equivalent to a return of between £11 and £12 per cow each year, and it is made up as follows:—

Milk consumed, fresh (at 1s. per gallon), 1 quart per family per day	£1,268,000
Milk, condensed, at 8d. per lb.	1,260,000
Butter made	3,220,000
Cheese made	176,000
Dairy cows, dried off and fattened for beef (at £9 per head)	720,000
Calves, for veal (at £1 per head)	340,000
Skim milk for pig feed	33,000

With 600,000 dairy cows in the herds of the State, the above average per cow may be taken as approximate, a large part of this return having been prepared from figures obtained under more or less careless and haphazard methods. All the same, it illustrates the wonderfully potential natural advantages the State possesses. Under anything like systematic management on even a bare majority of the farms, this average would be greatly increased. Good dairy farmers with fairly large herds will get an average production of over 600 gallons of milk per cow; whereas the average per cow yield of the State does not reach two-thirds of that quantity, indicating that there is room for an average increase in production of over £6 per cow per year. To a farmer with even fifteen cows this means that, by keeping only good dairying cattle and through good feeding, making them produce milk to somewhere approaching their maximum, another £2 per week could be added to his annual income, merely by the study and practice of systematic dairy farm methods.

If dairy farming is worth following as a business it might as well be made fully remunerative by those engaging in it. There is little

Map Showing Position of Victorian Butter Factories.

sense in so mismanaging any business that it becomes less profitable than it should be. The keeping of cattle which are at best only fit for fattening, and which hold to their milk for only a few months of each year, is the cause of great annual loss to dairy farmers. On large areas, under cheaper land values and cheaper labour conditions, this inferior class of milking cattle was formerly more profitable than now; and because the earlier settlers could pay their way with this class of stock their families see no reason to make special effort to vary their custom by breeding and culling to improve the milking quality of those cattle required for present-day dairying work.

In the earliest settlement cattle raising was one of the first branches of agriculture taken up; and the class of cattle best suited for raising beef, tallow, and hides, under rough country conditions, was far removed in quality from what is now required for advanced dairy farming. The dairying on the early cattle stations was rough work. The cows and calves were herded together through the day, but were rounded up in the evenings, and the calves drafted off from them. In the morning as much milk was taken from the cows as they would let down under the excitement of being roped into the bail with their calves bellowing near by. The calves were then turned out again with the cows until evening.

Under this method the cows seldom milked longer than over the few spring months; but they raised strong calves, and held enough condition on themselves to winter well and produce another strong calf each season. Those which milked longest and got low in condition in the summer months had little chance of surviving any unusual scarcity of grass, and it was the worst milkers that usually stood up best to any stress of season. This survival of the fittest, therefore, encouraged the increase of anything but good dairy stock. As the land became more settled, and dairying as a business began to break in upon the beef-raising, it was largely from the progeny of these old station cattle that the future dairy stock were bred. Selection of the cows on appearance, and mating with so-called dairy-bred bulls of more or less doubtful dairy quality has, in too many cases, been the foundation on which Victorian dairy herds were laid.

Where the milking performances of the breeding cows, both as regards quantity and quality, has been made the basis of selection, and development of dairy quality in the offspring has been also striven for by judicious selection of pure-bred sires on the dairy merit of their dams, both definite and rapid improvement in the productiveness of the stock has invariably been made. Special importations of certified high-class dairy cattle have for many years past been made by breeders of exhibition stock; but it is only recently that the dairy value of these choice imported cattle has been recognised.

The system of regularly testing pure-bred cattle as to their individual dairy excellence was inaugurated by the Victorian State Department of Agriculture in July, 1912, and the information thus obtained as to the actual dairy quality of pure-breed stud stock is now made available periodically. Dairymen have thus a definite guide to the utility quality of animals of whatever dairy breed they decide to use in the improvement of their herds.

The elimination of the old-time beef strains of cattle and their replacement with true dairy stock is, however, in many instances proceeding but slowly. Hundreds of farmers never read any dairy literature. Besides this, many who do read of big dairy records being made are sceptical of their being reliable. Their own experience does not prepare them to believe that other people's dairy cows can give three or four times more milk than those they own; and in disbelieving such records they close out all incentive to emulate them.

Thousands of farmers never weigh or test the milk of any of their cows, and know nothing definite about the yearly production in milk or butter-fat of their dairy stock. If it were not for the fact that there is generally a little cash coming in each year from the pigs and calves sold, many of these more careless dairymen would never be able to pay their way, owing solely to the number of unprofitable butter-producing cows they are keeping at the expense of whatever profit is made by their few good milkers.

Nevertheless, each year finds a few more farmers deciding to breed better stock, and it is not long before such change excites the inquiring notice of one or two of the neighbours, and they, too, are on the way towards the necessary improvement. Good cows make the dairying business highly profitable, and as the prosperous family seldom falls out with their special line of business, it may safely be said that in really profitable dairy cows lies one of the most effective means of making country life attractive. Stock-breeding is a science which aims at improving cattle by the systematic selection, mating, and general care of animals of the highest quality in some definite line of production. Amongst the thousands of farmers who raise cattle, very few indeed are justly entitled to be termed "breeders." Quite a large number of them are only spoilers of the work of others through indiscriminate selection, the deliberate crossing of established breeds, or the using of cross-bred bulls.

Definite improvement in stock-breeding can only be attained by the use of pure-bred sires which have been selected with the utmost care as to both excellence in the desired qualities, and soundness of constitution. Especially with dairy cattle is a correct knowledge of the breeding of the intended sire of high value. The ability of heifers to produce heavy yields of milk and butter will depend largely on the dairy quality of the dam and grandam of the sire, these qualities being hereditary to a surprising degree through the male side of the parentage. Soundness of constitution and inherent dairy quality have thus all equal bearing in the selection of stud stock, and must each be given full consideration; yet in this both are inseparable from that abstract quality which is spoken of as type.

Type.

When old-time farmers first set out to breed special dairy cattle they soon observed that the majority of animals which were heavy milk producers were not of the same body-shape as those which grew the best beef, the dairy-shaped animals being somewhat spare of flesh, and heavy in girth towards the hinder part of the body, while the beef stock put on flesh freely, and were deeper by far in the forequarter than below the loin. Breeding on these lines, two distinct forms of cattle were

evolved, each making for perfection on its own line, and each possessing a neatness of shape and beauty of outline consistent with the desired utility qualities, which have become known as dairy type or beef type respectively.

Sound Constitution Essential.

So far as can be judged from old-time pictures and sculpture, the original breeds of cattle had little in common with the present domestic stock. The accepted standards of beauty were different, but the animals were certainly wiry and robust. Under natural conditions, strength and soundness of constitution were not only essential to an animal's existence, but all matings were controlled by the ability of the strong, active males to drive off intruders from each herd. Natural breeding methods thus perpetuated strength, and especially along those lines of self-preservation, which combine the ability to both travel well and fight vigorously; and that soundness of constitution and physical fitness so essential for the preservation of cattle in their wild state is equally necessary, not only for the improvement, but for the maintenance of all herds of live stock.

Breeding Laws.

Breeding is presumed to be governed by certain so-called laws, but these at best can be but vaguely described, and how far these laws may be influenced by chance conditions is altogether uncertain. Nevertheless, enough knowledge has been gained concerning this subject to enable breeders to carry out their work with a reasonable prospect of success; and it is consequent on this that probable results from given lines of work are referred to as "laws." The principal of these laws are:—(1) That quality reproduces itself, and can also be developed; (2) That atavism, or reversion towards original characteristics, has always to be guarded against; (3) that unaccountable variations may be expected to occur at all times between the progeny of any mating over a succession of years.

Quality Reproduced.

In the practice of stock-breeding it has long been recognised that high quality will be reproduced with much greater certainty in the progeny of animals which have a definite blood relationship than if the parents are of breeding in any way distinct from each other. Continuous breeding from stock possessing some desired quality in a marked degree will accentuate that quality in the progeny, until it eventually will be reproduced with greater certainty in each succeeding generation. In fact, a quality which is present in both parents almost invariably reproduces itself in proportion to the blood relationship which exists between the parents; and it is this law which warrants the value of a pedigree in all stock-breeding.

Pedigree.

A pedigree is a concise record of an animal's lineal descent from ancestral stock, and those who are acquainted with the breeding of an animal through its pedigree are thus enabled to continue the work

which former breeders of that line of stock followed. Again, where it is hoped to improve some particular feature in one strain by mating with animals from another, a study of both pedigrees may assist greatly by showing where a blood line exists which is common to both strains. By such knowledge success may be insured more readily, for without it there is every possibility of atavism presenting itself.

Atavism.

Improved strains of cattle are the result of generations of work carried out along lines far removed from the original conditions. The modern dairy cow with her great capacity for turning a bulk of food into large quantities of milk could not exist in a wild state. Instances have been noted where domestic cattle having had the opportunity to become wild have bred, and under those conditions the cows only produce enough milk daily to feed the calves, and that only for a few months until they can subsist on grazing, at which time the cows go dry and begin to fatten. The result is that within a very few generations a marked reversion takes place towards the original rugged type of animal such as is best fitted to live and protect itself and its progeny under such rough conditions as are forced on them in their wild state. Unfavorable seasons and the resulting scarcity of fodder would be naturally provided against by animals laying on fat when food was plentiful, so as to enable them to tide over periods of scarcity. The ability of the modern dairy cow to turn a big bulk of food into a heavy yield of milk necessitates a continuity of food supply; otherwise she would milk on until she became too low in condition to withstand inclement weather, and consequently would die. Nature has therefore allowed that as soon as stock are away from domestic control they quickly recover those original characteristics which would permit of their surviving under the wild state. Pure breeding of stock for generations may have, to all appearance, eliminated all trace of wild character, but the slightest digression from a line of pure breeding encourages its coming again to the surface, and crossing breeds or even strains frequently affords that opportunity. Pure breeding of stock along definite blood lines is continuously making for improvement, but cross-breeding allows of a predominance of wild characteristics in a very few generations; and that tendency to revert to a former type is spoken of as atavism. Pure breeding of stock on definite blood lines thus makes for perfection in improvement, while cross-breeding is the direct route to deterioration in utility qualities.

Proper Feeding Maintains Type.

This atavistic tendency, however, seldom obtrudes without a mixing of blood lines occurs, and in such cases no one can forecast the result further than that it is almost certain to completely disorganize all progress which was being made by those who bred up that stock prior to the crossing. The exception to this is that by forcing stock to live under semi-wild conditions they may be altered very considerably both in appearance and producing capacity. The development of dairy stock has been concurrent with improved feeding methods, and these

latter have played no small part in perfecting the modern dairy cow. The well-bred animal, which has become stunted in growth through want of proper nourishment, will never make into as good a producer as similarly-bred stock which are properly fed. Breeding from animals kept under such semi-wild conditions as having to range far and wide to find sustenance encourages the tendency of reversion to the wild character and reduced milk production. Good breeding must be supported by good feeding in order to attain perfection.

Close Selection the Key to Success.

Suppression of atavistic tendency is most quickly attained by line-breeding, which is the systematic mating of only those animals which are of similar blood lines, for by this means progress may be ensured. In this, however, selection of well-grown robust stock for all matings is of the highest importance, as any combination of defects in constitution would result in these being intensified in the offspring. In the wild state robustness of constitution was essential to enable cattle to survive stress of seasons or attacks of predatory carnivora, and any weaklings had little chance of living long enough to breed. By this natural law of the survival of the fittest was perpetuated robustness in wild cattle, and in order to obtain best results breeders must exercise a most rigorous selection in regard to soundness of constitution in connexion with all stock matings. Where this is strictly followed line-breeding will make for success.

Crossing Makes for Deterioration.

All progress in pure stock-breeding has been made on line-breeding. When either pure breeds or strains of breeds are crossed, the result is a combination in the offspring of any inferior blood that may be behind each parent, and the predominance therein of undesirable characteristics. No line of cross-bred cattle will compare in production with similarly raised pure-bred animals; and it is this which puts the value on breed purity. All crossing of pure breeds makes for a reduction of some special characteristic which has been consistently developed by line-breeding; and the more cattle are crossbred the more inferior the quality of the stock becomes. All the world over the pure-bred dairy breeds are the most productive. Cross-breeding is a wasteful retrograde practice, the only excuse for which is ignorance.

Strain.

When a breeder has worked consistently for the improvement of one or more desirable characteristics in any stock, and has succeeded to such an extent that animals of his breeding become noted for such quality, he may safely claim to have established a "strain" of the breed worked with, consequent on the improvements having become hereditary in the animals bred by him. Any variation inherited from the parents through at least two generations is spoken of as being hereditary, whether it is of type, colour, production, temperament, constitution, or development; and in every strain some such feature will become so inherent as to be noticeable in the majority of the stock bred from it.

Variation Utilized.

Even under the most carefully carried out system of line-breeding there will at times be disappointments consequent on some stock not coming up to expectations; but, on the other hand, occasional super-excellence results, and from such happenings all great advancements in breeding have been made. The history of most breeds of stock contains records of some remarkable animals which have appeared amongst comparatively moderate stock, the special quality of which has been recognised and used to the general advancement of the breed. For instance, the size and shape of udders, as well as thickness and length of teats in dairy stock, has been greatly improved by selection in this way. Horns also which were so essential to the cow in its wild state, and are so awkward in the domestic animal, have in some breeds almost disappeared, while the others have been so reduced in size and substance that they are now of little inconvenience to those handling the cattle. In fact, almost all the good features of the high-class dairy cow have been developed by means of selection during the past two centuries; and on these same lines it is possible for every dairy farmer to make his cattle more and more profitable each year.

Breed to One Strain.

The several breeds and the strains within the breeds of domestic cattle have thus been formed by the mating together of animals similar in size, shape, colour, and other desirable features, and by the continued interbreeding of such stock when properly selected on robustness of constitution. Any tendency to revert to former characteristics then becomes subservient to the qualities more recently inherited. As mentioned, crossing with other breeds or strains has the tendency to re-introduce some of the original features, and retrogression is likely to follow; but the longer a breed is kept pure and free from any outcross, the stronger it will grow and the more resistant it will become to any atavistic influence. While, therefore, an experienced breeder may introduce stock of other strains of which he knows the pedigree into his own strain with a definite object in view, it is advisable that the beginner should carry on his breeding operations with animals of one strain only, or at least mate his cattle under the advice of some breeder who is well acquainted with the foundation stock of the strain the beginner is using.

Choosing a Breed.

The selection of the foundation stock is always a serious problem for an inexperienced person, for there are quite a number of items to be considered therewith. If there is any special fancy for some particular dairy breed, so much the better, every person being more likely to succeed with the breed that "catches the eye" rather than one in which interest has to be more or less acquired. In making a choice there are several breeds to pick from, and the several characteristics of these will be more fully set out at a later date. The Shorthorns, Red Polls, Friesians, and Guernseys are all somewhat large cattle, requiring richer and more level country and heavier feeding than the lighter stock of the Ayrshire and Jersey breeds. On lighter grazing

and in hilly country the smaller breeds will prove much the better stock to work with; many dairy farmers also prefer this class of stock to any other, even on rich country, as they are bred specially for dairying without any consideration of what is known as dual-purpose quality. Others again prefer the extra rich milk of either the Jersey or Guernsey cattle for all dairying purposes. Yet in all of these breeds there are various grades of milking stock; and there may also be much variation in the quality of the milk given by the different strains of any breed. The herd-test records of all stock should therefore be carefully examined when choosing foundation stock for a herd.

Where to Buy.

It will be advisable where possible for the beginner to buy the required stock privately even if a few pounds more may have to be paid per head, the probability being that there will be a better choice of good cattle to be obtained privately than in any markets, and there will be better opportunity to make a careful inspection of the animals. The markets are not usually satisfactory places for the inexperienced to purchase at, owing to the number of culls of various sorts which are sent there; but such sales should furnish the novice with some idea of cattle values in a general way. Wherever the purchases are to be made, it will pay to secure the services of a stockman of good repute to assist in making the selection. Where possible, young cows should be chosen in order that the buyer may get good returns from them for the first few years while he is establishing himself in the business, and that a lengthy breeding term may also be possible with them.

Build on a Good Foundation.

If the capital available will permit it, pure-bred stock will be the best to begin with. Otherwise, the next best will be good grade stock, or those as similar in appearance to the desired pure-breds as possible, for these mated to pure-bred bulls of the desired breed will throw stock having much of the quality of the pure-bred cattle. Certainly, the better the breeding of the stock obtained at the outset the more quickly will the dairy herd be established on a profitable basis, and it must be remembered that inferior dairy cattle are dear at any price as the foundation of a herd. Selection should therefore be made with the utmost care in order that only stock of satisfactory dairy quality will be obtained. In the absence of reliable information concerning the milk and butter-fat yields of any cow, the selection must be made on appearance, and it is here that the advice of an experienced stockman will be found most needful.

Production Follows Good Type.

Cows which conform in outline and general appearance to what is known as dairy type are usually good milkers so far as bulk flow is concerned; and the selection of ordinary dairy farm stock is made almost solely on this typical dairy appearance. When making the selection of animals which have had a calf, each quarter of the udder should be felt over carefully to ascertain if its tissue is soft throughout and free from

nodules or larger lumps, and if the teat passages are clear of any pea-like obstruction; by such examination before purchasing, the question of soundness or otherwise of the animal in that direction may be settled.

Usually all very good dairy cows may be recognised through their general appearance conforming closely with the typical points, but it is the various grades of cows other than the best milkers which require long experience to value correctly. Some people are very expert at estimating these values, such knowledge being usually the result of keen observation combined with long experience; but the majority of the cattle which are to be found on most dairy farms will show that either such expert buyers are very rare, or that most farmers are extremely unconcerned in regard to the quality of their dairy stock. In either case, the result is the same; and, consequently, through working with inferior stock, many farmers do not get anything like full returns for the work they put in with these inferior-shaped cows.

Points in Selecting.

It is always advisable not to purchase any animal which does not appear to be in perfect health or which is in low condition. Even if bad feeding is the only cause of an unthrifty appearance, it usually takes an animal some time to recover and gain the condition which will allow it to milk to its full capacity. Such loss of time, and the extra feed required, are sometimes not paid for by one season's milking. In the case of springing heifers and cows backward in calf, it is advisable where possible to have a written guarantee with them as to the period within which they will calve.

While it is always best to buy young cows when obtainable, it frequently happens that an aged cow will prove a profitable investment both for milk production and breeding, so long as ample green fodder is supplied. Cows of good constitution have given profitable returns in milk and butter-fat for even twenty years, although half of that time may be set down as the average limit of a cow's usefulness. Where hand-feeding is regularly practised, a good milking cow should be kept in work until she can be replaced with a better young one. The weight of each cow's milk, and her butter-fat yield, should be the standard on which culling out should be done; and 500 gallons of milk, or 250 lbs. of butter-fat for the season, is the minimum yield on which any matured cow should be kept in the herd.

The Guide to Age in Cattle.

The age of cattle in the first few years can be told by examination of the front teeth. A calf has eight somewhat small teeth in the front of the lower jaw at birth. When from fifteen to eighteen months old, the middle two of these are replaced by two larger permanent teeth; at about two years and three months, the next tooth to these on each side will fall out and be replaced; the third pair will be replaced at about three years old; and when at about four years old, there will be eight permanent front teeth, the animal will be spoken of as being full-mouthed. With advancing age, and, to a considerable extent, according to the nature of the pasture, these front teeth will wear down, become loose, and spaces show between them. This makes it more difficult each year

for the animal to keep up condition, even on good grazing, and necessitates more hand-feeding. These teeth may wear right down to the gum without falling out, but should any fall out or several become loose, the whole of them will be best drawn, and the animal kept altogether on hand-feeding until the gums harden sufficiently for her to graze again on good pasture. With good cows, this will occasionally be worth following; but otherwise, as soon as the animal's ability to graze properly becomes impaired, she should be fattened and sold for slaughter.

Choosing a Bull.

The choice of the bull to mate with the breeding cows of the herd is the most important item to be considered. On this will certainly depend the future progress or otherwise of the herd; and so far as dairy pedigree is concerned, no one should be satisfied with anything below the very best obtainable. As the Victorian Department of Agriculture has been conducting annual tests of pure-bred dairy stock for ten years past, there is now a wide field for selection amongst bulls bred from heavy-yielding dairy cows. All these cows and heifers so tested have stud-breeding pedigrees which are approved by the various societies controlling the registration of pure-bred dairy stock. In addition to this, all which give yields above the fixed minimum standards of profitable production are awarded a certificate. A list of certificated cows for the season, with their yields, is printed in the *Journal of Agriculture* each September. Through this the dairy pedigrees of all pure breeds of dairy stock are now available to breeders and farmers making their selection of stud stock; and each year the best lines of breeding animals are becoming more definitely known. Therefore, in whatever breed the beginner decides to take up, it is now possible to obtain reliable information on its dairy production at the offices of the Department of Agriculture; and the purchase of dairy-bred bulls can thus be accordingly made on fairly safe lines.

Loss by Cross-breeding.

Not only should the dairy record of the dams of the bulls be examined closely before the final selection is made, but the future sire must be of undoubted pure breeding. This is why the stud-breeding pedigrees are required of all animals submitted to these tests. Only pure-bred bulls will reproduce their dairy quality in the heifers with the desired uniformity, and no dairy farmer can afford to waste even one season in breeding calves from a cross-bred bull. It is not difficult to find a pure-bred bull whose heifers will give 50 lbs. of butter-fat per year more than the progeny of any cross-bred animal. It is this losing of 50 lbs. or more of butter-fat each year from each of the heifers and cows in the herd as long as they are kept which makes many a dairy farm unprofitable to work. Breeding better milking stock each season increases the profits year after year, and this can only be done by using pure-bred bulls of the best dairy pedigree. The Government herd-test records show where these high-class dairy bulls are bred, and the farmer can make his choice therefrom.

Value of a Pure-bred Bull.

The question is frequently asked, "What is the value of a good dairy bull?" The high prices paid for some of these animals may astonish those who do not look closely into the question. Most bulls will sire at least 50 heifers during their period of usefulness, and 30 lbs. of butter-fat is not at all a liberal estimate to make of the possible increase in the annual production of heifers as compared with that of their dams, consequent on good breeding. Assuming, then, only six lactation periods as the minimum average time these heifers would be kept in the herd, and with butter-fat selling at even 1s. per lb., the increased monetary return from using a well-bred dairy bull would not be less than £250. Such an increase is well within possible results if a proper selection of the bull is made. When it is also noted that these better milking stock form the basis of still further breeding improvement each year, it will be recognised that the actual value of a first-class dairy bull to any farmer who breeds his own dairy heifers may easily run to a very large sum of money.

How Loss Arises.

On the other hand, when it is realized that a bull bred from inferior milking stock, in most cases, will tend to reduce the dairy quality of the heifers rather than to improve them, and thereby cause much continued loss to the owner, it is strange that any one should question the wisdom of paying the price breeders ask for bulls from tested cows. It is quite an every-day occurrence to find in a dairy herd where no selection of the bulls has been made, that the best of the cows are the old ones, and the heifers are more or less of inferior milking quality; yet the owner does not grasp the fact that it is using cheap bulls that has cut down his dairying returns. When a selected dairy-bred bull may make a difference to the farmer of even £100 cash per year on the herd's production, it is very difficult to set a maximum limit on the value of that hereditary milking quality which a dairy pedigree expresses.

Striking Illustration of Dairy Quality.

As an illustration of this, we have the imported Jersey bull, Pretty Noble, owned by Mr. W. Woodmason, of Malvern, which sired 27 heifers, with an average of 290 lbs. of butter-fat in 273 days; the highest yield being 343 lbs. of butter-fat in the nine-months' term. Pretty Noble mated with Carrie 5th of Melrose (a 415-lbs. cow), threw the bull First Choice of Melrose, which was sold to the late C. G. Knight, of Cobram. First Choice was mated with eight cows, which themselves had an heifer average of only 244 lbs. of butterfat; yet eight heifers from these dams gave an average of 372 lbs. of butter-fat—an increase of actually 128 lbs. of butter-fat more in the 273 days than their dams made at the same age. This is remarkable evidence of better milkers being got from good milking cows by judicious mating.

One Breed and One Strain.

When breeding from pure-bred cows, or when grading up from cross-bred cows, no change of breed or strain should be made after the

first sire has been selected. By continually grading up with bulls of the same blood, the fourth generation of heifers should be largely of the appearance of pure-bred stock; and their production will have also made very satisfactory advancement. It is almost impossible to make any definite headway by changing about to bulls of different breeding. Crossing breeds is a backward step which invariably makes for deterioration in the average production of the progeny. The continued use of pure-bred bulls from high-testing dairy stock is the safe road to progress.

Continual Progressive Selection.

The ideal dairy-farm cattle are those which combine good type and high production. In selecting breeding stock, type must always be given full consideration; for, as already stated, conformity to accepted dairy type insures a good constitution and the ability to produce big yields of milk. Although the selection of the breeding stock may have been made to the very best advantage at the outset, further systematic selection must be adhered to year after year to insure improvement. The grading up of the herd on its production must always be kept going by weighing and testing the yields of each cow regularly, and disposing of those animals which are least profitable. A matured cow should produce at least 250 lbs. of butter-fat in each lactation period. Forty-seven cows in the Government herd test have each more than doubled this yield in the 273 days' test; while over 500 tests exceeding 400 lbs. of butter-fat in nine months have been recorded. With such a number of high-class producers to obtain stud stock from, no dairy farmer should be satisfied to breed from a bull whose dam has not produced well above this 400-lbs. mark, especially when there are stock obtainable of a standard even 100 lbs. higher than this. Only heifers from cows exceeding the 250-lbs. mark should be kept for dairy work, and each year this standard could well be raised considerably, and the cash returns from butter-fat will then advance yearly.

Keep the Stock Growing.

All calves should be well reared and cared for from birth, and, unless of pure breeding and from first-class dairy cows, all the males should be sold as vealers, aiming to market them with that glossy appearance of the hair which is indicative of good condition.

De-horn the Heifers.

The heifers raised from the best cows for future dairy work—unless of show quality—will be as well de-horned when about ten days old, by treating the horn-buds with caustic soda. This should always be done when the calf is hungry, as the struggling for liberty on a full stomach may upset them considerably. Towards feeding time, they may be handled with safety; if fed half-an-hour later, the temporary rough handling is forgotten. This de-horning is done by first tying the calf's legs; then laying it first on one side and then the other, clip the hair off the horn-bud, and rub the bud gently with caustic soda until a small red spot shows in the centre of it. The caustic soda solution should be strong, and applied by means of a small piece of rag tied tightly on the end of a small piece of stick, about 6 inches long by ¼ inch thick, cut

to a blunt point. Care must be taken that the solution does not touch the hands of the operator, or the skin of the calf, or a burn will result.

Handle Heifers while they are Young.

All heifer calves being raised should be kept in fair condition, neither fat nor yet allowed to get poor. With the heavier breeds, the heifers are mated from about eighteen months old; but with Jerseys, Ayrshires, and some of the heavist milking Friesians, the usual custom is to mate them at about fifteen months old. Heavy bulls should not be used with these younger heifers. As the heifers show signs of springing, it is as well to bring them into the shed occasionally, feeding and handling them there to get them used to the surroundings, so that when they calve there may be no trouble with them. It is not advisable to put forward heifers in with a herd of horned cows, as they are certain to get knocked about somewhat at first; but if they must be put to graze in the same paddock as the herd, they should be put through the shed in front of the older cows at milking time to avoid the bad treatment they would be certain to get if standing in the yard with the herd awaiting their turn. The handling in the shed before calving will accustom them to going into the shed quickly, and save much time when they come into milk.

Pure Stock.

There is no more interesting work in the whole range of farming than the breeding of pure dairy stock, and much added pleasure is certainly derived from developing and improving the quality of the herd when the profits are being increased at the same time. Those who are in the fortunate position to make stud-cattle breeding their hobby also frequently confer much benefit on their country generally. The spirit of friendly rivalry existing amongst breeders of each line of stock usually develops the desire to import cattle from overseas in the hope of improving those they already possess; and in this way first-class animals are brought in which prove valuable acquisitions to the State's dairy stock. But the beginner is under no necessity to look further than amongst the Victorian-bred cattle to find the highest class of producers. These, when fed well and handled properly, have shown that their dairy excellence is of the very highest standard.

A Close Study of Each Animal Requisite.

Definite rules cannot be laid down in regard to taking up or carrying on cattle-breeding, for the beginning is more frequently made in conformity with circumstances which are not all that could be desired, and with a very limited number of stock; while progress depends on foresight and pertinacity. The natural suitability of the owner for the management of stock will have very much to do with his success, for every animal in the herd will be found to have its own peculiarity of temperament; and, in order to succeed, the owner must be able to recognise this and handle the cattle accordingly. Close observation of every detail connected with the stock is therefore of highest importance; and the more quietly every animal is handled, and the more closely its treatment conforms to its individual peculiarities, the better will be the

results. Some people have a natural aptitude for dealing with stock which is of very great assistance to them, and enables them to acquire further knowledge of cattle management without difficulty; but there is nothing, in either the rudiments or more advanced principles of stock-breeding, that should present much difficulty to master. Sustained enthusiasm in the work will carry every one to success. There is ample room for all breeds and all breeders. Any competition only makes for increased interest in all live-stock matters, which is to the advantage of all concerned.

Specialize to Attain Perfecfion.

The rules which govern breeding at this present date are largely the result of observations by the more successful breeders. The highest success with cattle has invariably been attained where the breeder has worked consistently for the improvement of one definite quality in either milk or beef production, rather than a combination of these. Excessive production in either of these will always be at the expense of the other. Where the aim has been solely for meat production, cows have been bred which do not produce enough milk to properly raise their calves; and with heavy milk production, the tendency is towards an exaggerated leanness in carcass. There are many instances amongst what are known as the dual-purpose breeds, where big-framed and somewhat fleshy cows have given very heavy dairy-produce yields; but this combination of quality is very seldom reproduced in their progeny, the balance going to one or other of these extremes in utility quality. Specialization in either milk or beef production will always detract from perfection in the other, the result being that dual-purpose breeds are largely made up of mediocre animals, which, in the case of dairy-farm stock, makes for anything but a high average milk yield.

Ideal Conditions of Site.

The ideal location for either stud-stock breeding or general dairy farming work is similar, and is represented by comparatively level or slightly undulating country, well sheltered in winter and shaded in summer, with fertile soil and good water supply. Whilst a combination of as many of these natural conditions as possible should be sought, the water supply is by far the most essential feature of all. Where either the quality or quantity of the water supply is at all doubtful, dairying will not be carried on with complete success, while failure may even occur in consequence. A good road, and a situation convenient to the railway station and market, are also strong factors to success; for all time lost on the road has to be paid for somehow, and may prove a big handicap. Excessively hilly country is not very suitable for dairying, even though the land be of good grazing quality, for the extra exertion the cattle have to put out in travelling militates against top milk yields; while the chances of injury to the udders of the cows are increased where the locomotion is difficult. Any strenuous travelling, exposure to excess in temperature as regards either heat or cold, or a water supply which is either limited, inaccessible, or unpalatable to the cows, will each act adversely on the milk yield of the herd; and these are conditions which must be guarded against.

Subdivision and Fencing.

A convenient subdivision of the farm land into comparatively even-sized paddocks will be of much assistance, since by resting the paddocks alternately as required the grass is kept clean and fresh, with the result that the stock thrive better, and the actual carrying capacity of the farm is increased. All fencing and gates should be kept in good repair. Insecure fencing may result in injury to the stock through fighting, loss through cattle straying, or a season's work being disorganized by a mongrel bull getting amongst the herd. Disease may also be transmitted to the stock through wandering cattle, and cows frequently injure the udder in getting through broken fencing; whilst on the boundary of the farm, bad fencing is certain to cause trouble with the neighbouring farmer. By keeping all fencing and gates secure, much annoyance will be prevented, as well as possible loss.

Water Supply can be Improved.

Where the water supply is not convenient for the stock, it will pay to improve it to its utmost; and nothing is more satisfactory than the wind-mill and trough if the water is below the surface level; while a pipe and trough below the dam or spring which is fenced off from the stock will make all the difference between a satisfactory supply and the reverse. Stock should not be allowed to wade where they will foul the water, as this is almost certain to affect the keeping quality of the milk and cream.

Tidiness is Profitable.

Dairy buildings need not be elaborate, so long as they protect from the weather, keep stock in or out as required, and have impervious floors and drains to allow of the place being easily kept clean and dry. Where there is ample shade and shelter from heat cold winds and rain, the stock are more contented, and consequently thrive better; while all tidiness and systematic arrangement of yards, gates, buildings, cultivation paddocks, dams, &c., makes for convenience of working, and cheapens the cost of production. Anything that is inconvenient in the working of the farm should be remedied as soon as possible. Time is just as valuable to the farmer as to the banker, lawyer, or other business man. There are very few farmers who recognise this fact in either the general working of the place, or in the hours wasted in watching mongrel stock changing hands in the sale-yards. Any sale will draw a crowd, while many an instructive address on farm practice has lapsed for want of an audience. Time is the most ill-considered asset of the farmer.

SHEPPARTON CROP AND FALLOW COMPETITION.

Report by the Judge, H. A. Mullett, B. Ag. Sc., Chief Field Officer, Department of Agriculture.

By the adoption of this valuable method, both of discovering the best local farming practice, and of fostering its spread, the Shepparton Society has demonstrated that it is ready to move with the progressive spirit of the times, and do more to improve the standard of agriculture in the district than merely hold an annual show.

For several years past practically the whole of the agricultural societies in the Wimmera have conducted annual crop and fallow competitions, and find them of great practical benefit in improving local farm practice. For some reason, the idea has been slow to spread in the Goulburn Valley, but indications are not wanting that, shortly, the competition method will be adopted by all the leading agricultural societies there too. This year Elmore, Shepparton, and Dookie have pioneered the way.

Raising the Yield per Acre.

The first step towards obtaining increased crop yields in any community is not so much a question of immediate change of method as of mind. Experience shows that it is the mental attitude of the people that largely determines the rate of progress. Without a firmly-established belief that more payable results follow better methods, and that better methods can be discovered, little improvement can be hoped for. The widespread belief in the power of man to rapidly improve the yield of wheat by the discovery and use of more perfect methods is a characteristic of the Wimmera people. And who will say that the spirit of healthy optimism there has not borne fruit? The Statist's figures for the average wheat yield there for the past twenty-five years, comparing five-year periods at the beginning and the end, show the remarkable increase of 12.9 bushels per acre, *i.e.*, 169 per cent. The yield has been raised from 7.6 bushels per acre to 20.5 bushels per acre.

To-day there are those who talk of a 60-bushel crop era for the Wimmera. Far from being looked upon as incurable optimists, they may be regarded as rendering public service

While the Wimmera average wheat yield has been increased by 169 per cent., the yields in the northern district, including the Goulburn Valley, have increased only by 2.9 bushels per acre, *i.e.*, from 10.4 to 13.3 bushels per acre, or by 28 per cent. Do the present averages constitute the limit for the Goulburn Valley? If not, how far are they to be increased? Undoubtedly the first step forward must be the general recognition that present methods can be largely improved upon. Then the rest is comparatively easy.

THE COMPETITION.

Messrs. Furze and Jacobs, of the *Shepparton Advertiser*, with commendable enterprise, donated the principal prize. The entry was good —24 crops and 15 fallows—but the area of crop submitted to the judge —20 acres each entry—was too small to enable a very accurate examination to be made of the growers' general methods. There was too much room for the selection of small patches of crop whose superiority may be due to conditions outside the control of the farmer.

The competition embraced farms within a radius of 20 miles of Shepparton. It resulted in crops grown on the red loams at Dookie or at Toolamba competing with those on the cementy soils, with heavier rainfalls, as at Tamleugh and Karamomus, and again with those on the grey clay loams at Congupna and Tallygaroopna.

The dry season permitted of some excellent crops being raised in country which is normally too wet in winter for good results with wheat. It also favoured those crops grown on loamy ground as compared with those raised on the grey clay loams. In another year it might be desirable to invite entries for the crops and the fallows classified according to the class of soil on which they are grown. Probably two subdivisions would suffice.

Comfortable Farm Residence of Mr. T. N. Flight, Toolamba.

The week's tour enabled acquaintance to be renewed with the soils and methods of the district. The crops, except those at Toolamba, Arcadia, Karamomus, and Tamleugh, had suffered from the effects of the dry season. At Dookie, the rainfall for the year was only 10.63 inches, and at Shepparton it was 14 inches. The autumn and winter months were exceptionally dry, the early spring rains satisfactory, but November rains were absent. Except in the districts named, most of the crops were characteristically short, thin, and late. The thinness was due in part to the moderate dressings of seed applied locally, but in the main to poor germination. The autumn working of the fallows left them dry, too finely pulverized, and too deeply worked. Dry sowing was in many cases resorted to, especially where the farmer also had some stubble land to plough and sow. When rain came the soil cemented down with damaging effect on the germinating grain. But dry as the season was, there is no doubt that far better average results would have been obtained had all used the best methods. The free working loams, especially at Dookie, can be worked precisely like Wimmera soils, and that involves a great deal more cultivation than is at present given them. The grey clay loams present special problems of their own, in that injudicious cultivation may reduce them to the

dust-like powder which is fatal to good germination and subsequent healthy growth of wheat.

With respect to varieties, Major and Minister, both bred by Mr. Pye, at Dookie College, appear to have practically displaced Federation here. Of the Dookie wheats, Major is the most popular. It would be of great interest to have a comparative test locally of improved Federation made alongside Major. The average dressing of seed used locally is about 60 lbs. per acre, with a similar quantity of superphosphate. May is the popular seeding month. Many farmers sow about one-third of their wheat on stubble land. On the average the fallow is worked thus:—Ploughed 4½ inches deep in August and September, harrowed and cultivated in the spring, disced after harvest, spring-toothed ahead of the drill and sown.

Results.

Best Wheat Crop, 20 Acres.

The crop of Major wheat entered by Mr. T. N. Flight, of Toolamba, was awarded first prize, with a total of 95 points. Mr. L. Brown, of Tamleugh, gained 94 points and second prize, also with Major. Messrs. Bennett Brothers' crop of Minister, at Dookie, was placed third with 91 points. Highly commendable entries were also submitted by Messrs. Kittle Brothers, Arcadia (Major), and by Mr. T. J. Mellerick (Minister).

The winning crop, representative of 50 acres, was a magnificently grown one, if anything too tall, but very dense and regular throughout.

Residence and Farm Buildings of Messrs. Kittle Bros., Arcadia.

It was well-headed, fairly true to type, and clear underfoot, save for an odd saffron thistle. Altogether it was a remarkably heavy crop for the season. It was grown on a superior red clay loamy soil, which had been out in natural grass for six or seven years. The land was fallowed in July and early August to 4 inches deep, and then harrowed, and left in a mellow condition till after harvest, though it was "sheeped" when required. The fallow was disced shallowly in March, spring-toothed, rolled, and sown dry towards the end of April with 60 lbs. seed wheat and 112 lbs. of superphosphate. In the same paddock was 45 acres of Minister almost equally well grown. Attention has already been drawn to the fact that this crop evidently received considerably more rain than the average of those inspected elsewhere, but factors which must have contributed to the fine result are the early ploughing, the maintenance

The Winning Crop (Mr. T. N. Flight's), Toolamba. Variety, Major.
Grown on well-worked fallow; 112 lbs. of superphosphate per acre used.

of a clean mellow surface on the fallow throughout the year, and the heavy application of fertilizer used.

The crop placed second was grown on light grey soil, on rising ground, within 13 miles of Violet Town. Like the winning crop, it was thick and tall. It was notable for fine bold heads, quite free from weeds, but was not so regular throughout as that of Mr. Flight.

The land, which had been out in grass for some years, was ploughed in August to 4½ inches deep, and left in the sod. The following May it was disced very shallowly after rain, and drilled with an 8-inch drill, and harrowed. Sixty-five lbs. of wheat was used with 56 lbs. of superphosphate. The Tamleugh district receives a heavier rainfall than Shepparton. The treatment given the fallow is more suited to the soil and conditions at Tamleugh than it is in the drier parts of the district.

Messrs. Kittle Brothers' crop at Arcadia was portion of a fine paddock of Major wheat, some 100 acres in area. The apparent yield was

good, the crop fairly free from strangers, but some wild oats were present, for which points were deducted. The land was ploughed to 4 inches deep in July, and harrowed across the ploughing two weeks later. In October it was disced shallowly, and again in March. Early in May it was harrowed after rain, and then drilled, using 60 lbs. of seed with 60 lbs. superphosphate.

Mr. T. J. Mellerick's crop of Minister, also a heavy one for the season, is worthy of notice as having been sown on fallow which had been worked over twice in the spring with the rigid-tined cultivator. It was sown during the first week in May, and though 70 lbs. of seed per acre was used, the crop was somewhat thinned by faulty germination. Evidently the discing preceding the seeding had been somewhat deep. Seventy lbs. of manure were used. A tall crop of Bomen wheat was also entered by the same competitor, but was thin, apparently from the same cause.

Best Wheat Crop of 20 acres.

Details of Points Awarded.

Competitor.	Variety.	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**
F. N. Flight ..	Major	35	17	13	15	15	95
L. Brown ..	Major	34	18	14	14	14	94
Bennett Bros. ..	Minister ..	29	18	15	14	15	91
Kittle Bros. ..	Major	33	18	11	13	15	90
T. H. Flight ..	Minister ..	32	15	11	13	14	85
T. J. Mellerick ..	Minister ..	27	18	12	13	14	84
M. Lowry ..	Major	26	18	14	15	11	84
E. H. Wright ..	Minister ..	23	16	15	15	15	84
Bennett Bros. ..	Major	27	16	10	12	14	79
T. J. Mellerick ..	Bomen	25	19	8	14	12	78
M. Lowry ..	Minister ..	23	17	12	15	10	77
M. J. Breen ..	Federation ..	21	18	10	14	13	76
H. Fletcher ..	Minister ..	23	15	11	12	14	75
T. H. Roe ..	Major	25	17	11	9	12	74
Robison Bros. ..	Federation ..	24	16	9	9	15	73
J. Leahy ..	Major	24	14	12	11	10	71
E. H. Wright ..	Federation ..	18	16	14	10	13	71
W. R. Vincent ..	Yanward ..	11	19	13	14	14	71
H. Graham ..	Canberra ..	15	19	12	12	12	70
H. Fletcher ..	Red Russian ..	22	17	9	7	13	68
H. Graham ..	Dollar	21	19	5	8	12	65
J. McNab & Vincent	Dollar	15	19	13	7	11	64
M. J. Breen ..	Major	14	16	8	11	14	64
W. R. Vincent ..	Major	17	14	9	11	11	62

Results—Fallows.

In judging the fallows, each was tested with a spade in separate parts, and points were awarded for the apparent moistness of the under soil, for the character of the loose surface soil, and its general effectiveness as a preventive against evaporation, for the absence of weeds, and for the general thoroughness and judgment with which the implements had been used, as indicated by regularity of the depth of cultivation,

the consolidation of the seed bed, &c. Some difficulty was experienced in making fair comparisons, because the varying soils entered in some cases required quite different treatment.

The results were:—Messrs. Bennett Brothers' No. 2 entry, first place, with 95 points; Mr. W. A. Trewin's fallow, and Messrs. Bennett Brothers' No. 1 entry equal for second with 94 points; Mr. T. J. Mellerick, third, 93 points. Then follow Messrs. Bennett Brothers' No. 3 entry, Mr. A. R. Vincent, and Mr. T. H. Roe.

Heavy Crop of Major Wheat, grown by Mr. L. Brown, Karamomus. (Awarded 2nd prize.)

Excellent Crop of Minister Wheat, grown by Messrs. Bennett Bros. (Awarded 3rd prize.)

Messrs. Bennett Brothers' No. 2 entry comprised 50 acres of the friable black clay loam on the flats near Dookie; it also contained some patches of red loam. The texture of the soil is such that it can be summer fallowed. The paddock was disced shallowly in March, dry, and in August ploughed shallowly. Subsequently it was harrowed in September, spring-toothed in October, then harrowed—all after rain. Digging with a shovel showed the soil at a depth of 9 inches so moist that it could be moulded in the hand—a tribute to the skill of Messrs.

Bennett Brothers' method of fallowing, which is now based on Wimmera style. Messrs. Bennett Brothers' No. 1 entry was a red loamy soil on the slopes of a hill. It was ploughed to 3½ inches deep in August and September, then harrowed in September, and again in October, after rain. Messrs. Bennett Brothers' policy is to harrow after every rain of consequence, with the object of preserving the mulch, and so retaining the moisture.

Mr. W. A. Trewin's fallow was located at Tallygaroopna, on reddish land of loamy texture. Mr. Trewin believes in thorough cultivation of the fallow, and "takes as his pattern the gardener." The moisture content was satisfactory, the mulch of loose soil 3 inches deep wherever

Judging the Winning Crop.

tested, and there was evidence that the cultivation implements had been carefully manipulated. If anything, the texture of the mulch was rather fine for the class of soil. The following working was given:—Ploughed in July to 5 inches deep, harrowed, rolled in September with spike rollers, and disced early in October.

Of special interest was Mr. T. J. Mellerick's fallow at Arcadia. The soil was a red clay loam. It was ploughed in June to between 5 and 6 inches deep, harrowed in July, cultivated with the rigid-tined cultivator in July, disced first week in September, spring-toothed at end of September, and then harrowed. The mulch was of mellow texture, and regularly disposed, and not too fine. The cultivation had been well done, and the seed-bed well consolidated at about 2½ inches below the surface. The use of the rigid-tined cultivator is of interest, because it will do work which is intermediate between the spring-toothed cultivator and the disc; hence weeds can frequently be cut, and the surface kept loose without recourse to the disc cultivator. The moisture in this fallow appeared somewhat deficient.

Mr. A. R. Vincent's fallow had been prepared almost solely with the disc cultivator. It was disced in July, again in part at the end of August, then harrowed; disced again in October, and then harrowed.

Interesting comparisons will be available next year, when the crops grown on these fallows are judged.

Highest Aggregate for 50 acres of Fallow, 1922, and for the Crop on the Fallow, 1923.

Details of Points Awarded for Fallow.

Competitor.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible points	**25**	**25**	**25**	**25**	**100**
Bennett Bros. No. 2 ..	25	23	23	24	95
W. A. Trewin	22	23	25	24	94
Bennett Bros. No. 1 ..	24	23	24	23	94
T. J. Mellerick	21	24	24	24	93
Bennett Bros. No. 3 ..	22	22	23	23	90
A. R. Vincent	21	21	24	23	89
T. H. Roe	20	24	24	21	89
Jas. Phillips	21	22	25	20	88
W. Ross	21	20	25	21	87
A. E. Dainton	20	21	25	20	86
R. Pogue & Sons.. ..	20	19	25	19	83
McNab & Vincent ..	21	20	20	21	82
— Kerr	23	21	19	19	82

Heavy Crop of Major Wheat.

Working Goulburn Valley Fallow.

There can be no question that careful cultivation of the fallow plays as fundamental a part in the growth of a successful crop of wheat in the Goulburn Valley as it does in the Wimmera. Comprehensive reasons were advanced in the report furnished the Elmore Society why the stubble sowing of wheat must be abandoned in the Goulburn Valley if the yields and the profits are to be enhanced. At the Rutherglen Experiment Station, on fairly poor grey soils, for a period of six years, the yield of wheat grown on land ploughed just before seed time, averaged 12 bushels per acre. Where the land was July-fallowed, and cultivated in the spring, and again in autumn, the average yield was

18.4 bushels per acre. That implies, for this class of land, an 18.4 bushel average for the farmer who sows all his wheat on fallow, and a 16.2 bushel average where one-third of the wheat is sown on stubbles. But on the better soils at Shepparton, it would be quite safe to infer that still greater comparative increases from fallows would result. Once the cost of production is met, it is the extra bushel or two that gives the profit.

In the working of the fallow there is no justification for a slavish emulation of Wimmera methods, except on soils of similar texture. These occur at Dookie on the black flats, and again in any really free-working red loams. The methods likely to give best results for these soils were outlined in the Elmore report. On the balance of the land, and, so far as Shepparton is concerned, the greatest proportion, the nature of the soil is obviously different from that of the Wimmera. It is more allied to some of the red clay loams there, which do not present

Excellent Fallow—Mr. T. J. Mellerick's, Arcadia.

(The excellent condition of this fallow was largely due to the use of the rigid-tined cultivator.)

any difficulty in being consolidated, but which, on the contrary, tend to set down tightly very rapidly after rain, and hence present difficulties in being maintained in satisfactory tilth. When repeatedly worked over, especially if dry, and particularly with the disc cultivator, they are readily reduced to a fine flour-like condition, which is not a satisfactory germinating medium for grain, nor when cemented down by rain to a flat condition later on, is it suitable for the growth of thrifty plants.

Depth of Ploughing.

The standard depth of ploughing these soils has for years been about 5 inches deep. But following Wimmera practice for black soils there are those who are now ready to believe that much shallower ploughing would pay better. Their views do not receive any support from the cultivation tests conducted at Rutherglen. For a six-year

period the half-acre plots ploughed to various depths, and sown with Federation wheat, gave the following average results:—

	Bushels per acre.
Ploughed 3 inches deep in July, and cultivated ..	15.6
Ploughed 5 inches deep in July, and cultivated ..	18.0
Ploughed 7 inches deep in July, and cultivated ..	19.3
Ploughed 9 inches deep in July, and cultivated ..	19.1

So that, apparently, the deeper the ploughing, up to 7 inches, provided the subsoil will permit, the higher the yield. Of course, the increase obtained by the very deep ploughing does not justify the extra labour involved, but the test shows a very definite trend. Shepparton wheat-growers then, on this class of soil, should look to it that a good 5-inch depth is maintained.

It has been urged that subsoiling to greater depths would permanently increase the yields to an extent that would justify the high cost, but tests made at Rutherglen do not support that view either. A series of plots similar to those just quoted have been subsoiled to 18 inches in

Sheep Grazing Lucerne at Mr. T. N. Flight's, Toolamba.

addition to the usual ploughing. An increased yield was obtained, but a very slight one where the depth of ploughing was over 3 inches. Even here the influence of the depth of ploughing can be noticed. It has not been masked by the subsoiling.

	Bushels per acre.
Ploughed 3 inches deep in July, subsoiled, and cultivated	18.2
Ploughed 5 inches deep in July, subsoiled, and cultivated	19.7
Ploughed 7 inches deep in July, subsoiled, and cultivated	20.4

Time of Ploughing.

Valuable guidance is also furnished by the same series of experiments on the time at which the land should be fallowed for the best results. Wheat (Federation) has been grown on land fallowed to a depth of 5 inches deep in July. Alongside each year was a crop of the same variety sown on the same day, and with the same quantity of dressing of seed and manure, on land fallowed to 5 inches deep, but in

October. Both fallows were kept cultivated. The following is the result of the average for six years:—

	Bushels per acre.
Ploughed 5 inches deep in July, and cultivated ..	18.4
Ploughed 5 inches deep in October, and cultivated	15.8
Increase due to early ploughing	2.6

Further than that, a test was also made to determine the effect of subsequent cultivation on land ploughed early, and on land ploughed late. The following are the average results for the six years:—

	Bushels per acre.
Ploughed 5 inches deep in July, and cultivated ..	18.4
Ploughed 5 inches deep in October, and cultivated	15.8
Ploughed 5 inches deep in July, and not cultivated	15.3
Ploughed 5 inches deep in October, and not cultivated	15.6

Farm Residence, Shepparton.
(Note sleeping-out accommodation.)

In other words, it is of little advantage to plough early if it is not intended to cultivate the land afterwards and, further, if the ploughing is late, no amount of subsequent working can compensate for the original delay.

The whole of these results are based on carefully conducted tests, in which the yield of each half-acre plot was harvested and weighed. They ought to be a reasonably accurate guide to Goulburn Valley wheat-growers on the more refractory soils, at any rate until disproved by tests made locally.

With respect to the working of the fallow on this class of land, there is, unfortunately, no such definite evidence available. Until tests are made, the best method of treating them must remain a matter of opinion.

The objects of working the fallow are quite definite—the method of best achieving them another matter. Weeds must be destroyed, a seed bed prepared, but, above all, moisture must be retained in the under

soil from spring through the summer for the benefit of the next crop, and for the purpose of allowing the processes of plant food formation to proceed at their maximum. A dry, cloddy fallow is an idle factory, whereas a moist fallow is a hive of industry. The difficulty which attends the maintenance of a satisfactory mulch on the refractory Goulburn Valley wheat land arises chiefly from its tendency to set hard quickly after wetting.

Great things were once hoped from lime as a soil amendment on these soils. Repeated heavy applications made at Rutherglen have produced results of the following order:—

	Average of 6 years.
Super., 1 cwt. per acre	15.7 bushels per acre
Super. 1 cwt., and lime 5 cwt. per acre	17.0 bushels per acre

The lime was applied each year.

Home of Messrs R. Pogue and Sons, Toolamba.

Wherever the lime has to be carted and railed any distance, and is therefore costly, there is no great incentive to put it on, if results of that order only are to be obtained. But there is lime at Cosgrove, which is cheaply obtained, and which, at any rate, should pay to top-dress on wheat land in the immediate vicinity. Astonishing results have been obtained during the past two years with gypsum on cementy soils in the western Wimmera. Perhaps this is the soil amendment for which wheat-growers in the Goulburn Valley are looking. Until the duration of the effect of gypsum is tested over a period of several years, and the facts obtained, there remains nothing but the treatment of the fallowed land with more judgment and with more suitable implements than those commonly used. Fallows should be worked over rapidly after rain with an implement capable of covering the ground quickly to kill small weeds, and to maintain the surface mulch to a depth of from 2½ to 3

inches, and yet not pulverize the soil. The spring-tooth, though satisfactory when weeds are young and the soil light, does not fill the bill entirely. The disc cultivator, though essential for killing weeds and thistles that have got out of hand, and for working up neglected fallow, has the great drawback that it powders the land too fine, leaving the clods below, and that it cannot be maintained at a regular depth. Besides these regular implements, Goulburn Valley farmers badly need a cultivator of a type midway between the two named. There are two that suggest themselves—the rigid-tined cultivator with weed-cutting attachment, and the modern Wimmera type scarifier. These implements will cut weeds better than the spring-tooth, and having stronger feet will turn up crusted fallow better, and do not pulverize the soil too much. Public trials of them should be fostered by the agricultural societies interested. A more rapid method of draught than horses would be an advantage, and that opens up the question of tractors.

If more prolific wheat crops are to be obtained in the Goulburn Valley, apart from the need of good fallow, it is probable that more seed per acre should be sown, and more superphosphate must be drilled in. On well worked fallow 75 lbs. of seed per acre is not too much to apply, with 112 lbs. of superphosphates. The winning crop was manured at that rate.

BENALLA CROP AND FALLOW COMPETITION.

Report by Judge, P. B. O'Keefe, Manager, State Farm, Rutherglen.

Judging took place on the 11th December, which was rather late, one competitor having completed harvesting, and another had partly harvested his area. This being the first competition of its kind held in Benalla—in fact, the first in the north-east of Victoria, a live interest has not yet been aroused among farmers, and the number competing was limited to three in the crop and fallow section (Mr. F. Hall having withdrawn his crop), and two in the crop competition. However, great things often owe their existence to small beginnings, and the president and secretary of the society take an optimistic view, and hope to have a much greater number competing in future. Many farmers, apart from those competing, also expressed their intention of entering the arena next year.

Even with the small number of crops judged, the object for which the competitions are held was to some extent achieved, as in each section the winning crop was very good, considering the season, and in striking contrast with the average crops seen in the district. This proves that there are methods of farming which will produce payable crops under very trying conditions. One way to ascertain what these methods are is to study the practices of farmers who consistently produce better crops than their neighbours.

Benalla is a district of relatively heavy rainfall. It may be argued, therefore, that fallowing is unnecessary. Some local farmers, whose opinions must be respected, find the yields after fallow much improved, and wisely argue that if there is any disadvantage at all it is the loss of the use of the land for grazing during the period it lies fallow, which is from, say, July or August in the year of fallowing to April or May.

the month of seeding in the following year. They hold that, during most of this period there is ample feed on the farm due to the natural spring growth, followed by the stubble from harvested crops. Thus with a proper system of rotation the loss of the grazing from fallowed area may be written down to a low figure, whilst the benefits gained are very apparent.

Some Advantages of Fallowing in the North-East.

(1) Fallowing may be done at a slack time, and when the land is in a suitable condition for deep and thorough ploughing. Under these conditions the maximum area may be ploughed per day with a minimum of labour, horse flesh, and wear and tear.

(2) Fallowing, followed by proper cultivation, conserves the soil moisture for the use of crops at a period when they most need it, for even in heavy rainfall districts dry periods frequently occur, when moisture in the soil is a valuable asset.

(3) The clay lands in the north-east of Victoria have a tendency to bind and set down hard; there is nothing which overcomes this trouble so effectively as a deep fallow cultivated at the right time, and in a proper manner.

(4) In the north-eastern districts the autumn rains are often delayed sometimes until the end of May, and, in extreme cases, until June. When once the break comes, rain usually sets in, and continues, more or less, right through winter, leaving only a very limited period and that broken time, during the shortest days of the year, to prepare and seed land. The farmer with an area of well-worked fallow not only reaps a benefit from the sprouting of wild oats, thistles, &c., and turning them under to insure a clean crop, but also he is safe to plant at his leisure right along from the beginning of May, whether rains fall or not.

(5) The main value of fallow tillage, however, is that of providing the most suitable conditions in the soil for the vigorous operations of germ-life in the surface layers of the earth. This enables them to break down and render available for succeeding crops the vast stores of plant food which, but for such bacteria, would to a large extent continue to lie dormant in the soil.

THE COMPETITION.

No. 1 Section—Best Area of Wheat, not Less than 30 Acres, Grown on 1921 Fallow.

In this section, entry No. 1 of Mr. D. Smith, of Goorambat, was placed first with a total number of 168 points out of a possible 200, and Mr. Henry Hill, of Stewarton, second with a total of 165 points.

The winning crop was a 50-acre paddock of "Joffre." It contained a large number of strange heads, for which points were heavily deducted. Very few weeds were present, and only an odd plant showing signs of flag smut, and a very odd head showing ball smut were to be noticed. This crop, in common with practically all of those inspected, was uneven, due mainly to the varying quality of the soil, and the lodging of surface water on the lower levels. The unevenness was very pronounced in the length of straw, but not so pronounced in the

length of ear. However, the shorter portions looked like yielding heavily.

The crop was grown on land which produced its last wheat crop in 1918, after which it was left out to pasture until it was fallowed to a depth of 5 inches in August-September, 1921. Sheep were allowed access to the fallow until February, 1922, when it was cultivated with a one-way disc. It was allowed to lie in this condition until May, when it was spring-toothed, harrowed, and seeded, 60 lbs. pickled seed and 80 lbs. superphosphate being used.

Mr. Henry Hill's crop of Major, grown on a 30-acre field, was reasonably true to type, showing only a small number of strange heads. It was fairly even, considering the varying quality of the soil, &c., but showed a heavy sprinkling of wild oats.

This field was sown with wheat in 1920, fallowed to 5 inches deep in October, 1921, was harrowed, disced, and spike-rolled about the end of November, harrowed again about February, and left lie until the end of May, when it was spring-toothed and drilled, 60 lbs. pickled seed and 90 lbs. superphosphate per acre being used.

The crop awarded third place was Mr. D. Smith's No. 2 entry, which was a 50-acre paddock; 25 acres was sown with Minister, and 25 acres with Major; the whole scored a total of 142 points. Both areas contained a few ears of barley and strange wheats, also a sprinkle of wild oats throughout, the Major portion being the cleaner of the two. The crop generally was poor and light, and appeared to justify the comments of the judge in his report, on this field, in the fallow competition. This land was cropped with wheat in 1919, with oats in 1920, fallowed 5 inches deep in September, 1921, and allowed to lie until March following, when it was harrowed, and run over with a spring-tooth cultivator; was again harrowed in May, prior to being drilled with 60 lbs. pickled seed, and 80 lbs. super. per acre. The growing crop was harrowed and spike-rolled in August, and was not fed off.

Details.

Section 1.—For Best Area of Wheat, not Less than 30 Acres, Grown on Fallow which Competed in Fallow Competition, 1921.

	Variety.	Yield.	Trueness to Type.	Freedom from Disease.	Absence of Weeds.	Evenness.	Total for Crop.	Total for Fallow.	Grand Total.
Possible Points		**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
D. Smith, Entry No. 1	Joffre	28	15	14	14	13	84	84	168
Henry Hill	Major	26	18	14	11	14	83	82	165
D. Smith, Entry No. 2	Major and Minister	19	17	13	11	12	72	70	142

Section 2—Best Wheat Crop, not Less than 30 Acres.

In this section, Mr. Richard Lindsay, of Stewarton, was placed first with a total of 90 out of a possible 100 points. His was a very heavy crop, true to type, and showing only a very odd strange ear, free from wild oats, &c., the only weeds noticeable being a small patch of spear

grass close to a headland, apparently where the plough had risen. A small amount of flag smut was noticeable.

The paddock, comprising a red loamy bank and grey clay soils, was sown half in oats and half in wheat in 1920, and was fallowed 4 inches deep in August-September, 1921. The red soil portion (about 15 acres) was cultivated, and planted with millet and 30 lbs. superphosphate per acre about the end of October, 1921. The balance of the field was harrowed at the same time, and again late in January, after rain. After the millet was fed off, the whole field was cultivated with a spring-tooth cultivator early in May, and sown with 75 lbs. pickled seed, along with 85 lbs. superphosphate per acre. The rough patches of land were then rolled with plain roller, and the whole area harrowed. This was easily the best crop inspected, and the treatment given the soil, particularly the grey clay, appeared to be the nearest approach to what is desirable under the conditions prevailing at Benalla. The soil under the crops still showed a nice cloddy condition, and was free from that hard, unyielding surface, which is noticeable in the clay soils of the north-east when they are not carefully tilled. It appeared that judicious feeding off with sheep of the red soil portion of field in the early stages of its growth would have reduced the bulk of straw, and possibly increased the yield of grain.

Mr. Henry Hill's crop, which also competed in this section, comprised four different varieties of wheat, viz., Major, Yandilla King, Federation, and Minister. Portion of the Major showed up well, but was very light in places, and generally uneven. Part of the area appeared to suffer through faulty ploughing. It contained a sprinkling of strangers and thistles, and some take-all and ball smut were noticeable. The Yandilla King portion, a small area, was fairly even, true to type, and free from weeds. The Federation and Minister were uneven, and generally unattractive, showing a few strangers, and the last-mentioned variety had lodged in parts.

The field was sown with wheat in 1919, was fallowed from 3½ to 4 inches deep in October, 1921, harrowed in February, 1922, cultivated with spring-tooth cultivator in May, and seeded with 75 lbs. pickled seed, except in the case of the Yandilla King, where 1 cwt. of superphosphate was allowed per acre. The crop was not fed off.

Details.

Section 2—For Best Wheat Crop, not less than 30 Acres.

	Variety.	Yield.	Trueness to type.	Freedom from Disease.	Absence of Weeds.	Evenness.	Total.
Possible Points ..	.. .. ..	35	20	15	15	15	100
Richard Lindsay ..	Major	30	19	14	14	13	90
Henry Hill ..	Major, Yandilla King, Federation, Minister	23	19	12	13	13	80

A feature of the competitions was the number of varieties of wheat grown. In the crops judged there were no less than six different varieties. This would indicate that district farmers are anxious to ascertain definitely, and at their own expense, the most suitable variety for their district. In the instance under review the bulk of evidence appeared to be in favour of Major. Experimental work of this kind, however, is too expensive for the average farmer, and a great deal to assist wheat-growers might be done by the local agricultural society co-operating with the Agricultural Department in conducting, on a small scale, experimental plots. The tests I would suggest are as follows:—

(*a*) Variety trials where, say, ten different varieties could be tested.
(*b*) Fertilizer trials.
(*c*) Rates of seeding trials.
(*d*) Time of seeding trials.

There still remains a large field for exploitation by farmers themselves in the following:—

(1) Judicious feeding off with sheep of crops in the early stages, when they are making too rapid growth; this especially in tall-growing varieties.
(2) Rotation of crops including pasture for sheep, thus keeping in check wild oats, thistles, weeds, &c., of all kinds, and avoiding excessive cultivation with the consequent plough-sickness of the land.
(3) The use of pure, selected seed wheat of the most prolific varieties.
(4) The ploughing of low-lying areas in narrower lands, with furrows running with the natural fall of the land. The making of surface drains to prevent, where possible, water running into cultivation paddocks, or in those cases where depressions run right through the centre of fields, to make drains at the lowest points to prevent stagnation and drowning of crops.

More attention might also be paid to a system of more careful and thorough pickling of the seed.

HOUSING POULTRY.

By W. C. Rugg, Poultry Foreman, Werribee Research Farm.

Site.

The best site for the poultry yards is a slope with a north-eastern aspect, having a clear opening through which the morning sun may reach the yards. Good drainage is essential, as poultry will not thrive on heavy wet soil; sand or sandy loam is undoubtedly the best, though, of course, there are successful poultrymen throughout the State who are keeping fowls on various other kinds of soils.

Start.

However small the start in poultry-keeping, a ground plan should be prepared before any buildings or fences are erected. This plan should provide room for the extension of every class of building it is intended to erect, and the possibilities in this direction should be well thought out. In the arrangement of the buildings, due consideration should be given to the convenience of feeding and watering. Where a large number are to be kept this is most essential.

Buildings.

All buildings for adult stock should face the east, whether it is intended to keep them on the intensive, semi-intensive, or open system.

By the intensive system is meant keeping the birds all the time in sheds and supplying them with everything they need—food, water, green stuff, shell grit, charcoal and material for the dust bath.

On the semi-intensive system they are kept in sheds as above, but allowed an outside run in fine weather.

On the open system the birds are always at liberty, and use a house only for roosting in at night.

In Victoria the open-fronted house is best; and as the north, west, and south sides are closed in, the birds are protected from the strong wind and heavy rain that sometimes come from those directions. Very little wind or rain comes from the east.

By having the east side open, or nearly so, the early morning sunlight will shine right into the house; this will keep the air sweet and pure and help to keep in check vermin, which become numerous and almost impossible to exterminate in dark, ill-ventilated buildings.

The three sides of the house should be wind-proof, as draughts have a bad effect on birds. It is very important that the roof should be rain-proof; damp floors cause foul odors to rise, and are often the cause of unhealthiness amongst birds.

Great attention should be paid to the floor, which should be from four to six inches higher than the ground surrounding the house. This will ensure a dry floor at all times, as the water off the roof will not soak in on the floor.

Concrete laid to a depth of one and a half or two inches forms the best floor, and should be covered with either cocky chaff or straw as scratching material. Where it is not possible to put in concrete, a good floor can be made from some soils, well wetted and rammed smooth. Both in the Goulburn Valley and at Werribee good floors can be made by puddling the soil with a spade to a depth of from four

to five inches, working in sufficient water with the soil to make it about the consistency of porridge. It should then be allowed to set for three or four days, and then gone over with a rammer. A piece of redgum 6 in. x 6 in. x 12 in. with a piece of ¾-in. water pipe in the centre for a handle makes a good tool for the job. Should the floor show any cracks, a little sand or powdered earth swept in and again rammed will make a good finish. Where the soil is suitable a splendid floor can be made in this way, and it will set so hard the birds cannot scratch holes in it, and it is easily kept clean.

Material Required for Buildings.

In choosing material for the house one must be largely guided by what is available in his district.

Excellent houses may be built of flattened-out kerosene tins, but it is necessary to paint these or their life will be short.

Palings put on the lap and space principle are often used, though there is a great risk of vermin breeding in the cracks. They can, however, be kept down by frequent sprayings with kerosene or carbolic emulsions, which can be very easily and cheaply made. An effective emulsion can be made from the following materials:—

1 lb. common soap
2 gals. kerosene
1 gal. boiling water.

This emulsion may be used in the proportion of one part to ten parts of water.

A very good temporary house can be made by building a frame and covering it with tarred bags, but corrugated iron should always be used for the roof.

In some of the Northern districts mud bricks are used. Where the soil is suitable they can be very cheaply made and will last a lifetime, but I consider galvanized iron the best of all,—plain iron for the ends and back (26 gauge will do), corrugated for the roof, and if the framework is on the outside very little harbor is left for vermin. The iron should have two coats of Arabic or some other heat resisting paint. This is not expensive, and if put on well it will last three or four years, and will probably save the lives of some of the best layers, as it has been our experience that it is the heavy layer that goes down first with heat apoplexy.

Ventilation.

It is most important to provide ventilation at the back of the house, and we find the best way to do it is to allow a six-inch space between the roof and the top of the back wall; a weatherboard can be hinged to the roof plate, and in hot weather it may be opened up, thereby allowing a current of air right through the building under the roof. This will lower the temperature of the house considerably.

Height.

The poultry house should be of a height to allow head room when working in it. We find six feet in front sloping to five feet at the back sufficient for narrow houses used for breeding pens, single-testing pens, or those for small lots of twelve to twenty birds, but where it is desired to keep larger flocks on the intensive system, it is advisable to have the houses from one to two feet higher.

Perches.

The perches should be not less than two inches wide, and when required for a long house 3-inch x 2-inch hardwood with the corners planed off is most suitable. For smaller houses 2-inch x 1-inch timber will do. It is best to suspend them from the roof by wire—if this is done the house is much easier to clean, as there is no obstruction for broom or scraper; it is also much better for the birds. The perches should have a coat or two of hot tar before being placed in position—this will fill up any cracks in the timber, for it is in these cracks and crevices that mites make their home and breed, and emerge at night to prey upon the fowls, only leaving them when they are gorged with blood; it is owing to the colour they assume when filled with blood that they are commonly called Red Mites. These are one of the worst pests in a poultry house, and it requires constant attention to keep them in check.

Perches should not be less than two feet from the ground, so that the birds can pass freely underneath, and also leave plenty of room for the use of a broom when cleaning out. If dropping boards are used the perches can be hung three feet from the ground, and the dropping boards should be 14 inches below the perches.

The perches should be all on one level—not one above the other, as used to be the custom. If the perches are of varying heights the birds will fight for the topmost position, with the result that some may be injured.

The higher the perch the greater the danger of birds bruising the ball of the foot, resulting in what is commonly known as Bumble-foot. This is not only painful to the birds, but often renders the male bird useless for breeding purposes.

About seven inches should be provided for each bird on the perch, and where more than one row of perches are used they should be 15 inches apart.

Nest Boxes.

When possible, nest boxes should be placed 2 feet or 2 ft. 6 in. from the ground, as it saves time and makes it much easier for the attendant when gathering the eggs. Kerosene or petrol tins make the best nests, and are easily kept free from vermin. One nest tin to every four birds is sufficient.

Litter.

It is advisable to keep from four to six inches of scratching material on the floor of the house, either cocky chaff or straw. The front of the house should be boarded up 15 or 18 inches to keep the scratching material inside the house and prevent waste. If this is done a supply will last three or four months. In wet weather the grain can be fed to the birds in this litter instead of on the ground.

If dropping boards are used they prolong the life of the litter, as most of the manure is voided at night and falls on the boards instead of into the straw. It is a simple matter to rake off the manure and scatter a few handfuls of sand on the boards. This prevents the manure adhering to them.

Size of Houses.

A house 6 feet x 8 feet will accommodate from twenty to twenty-five birds if they have an outside run, but if it is desired to keep them con-

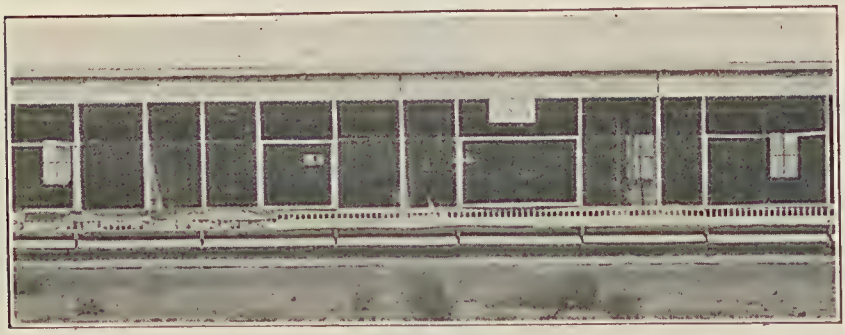
fined on the intensive system, 4 square feet of floor space should be allowed to each bird.

It is generally believed by poultrymen that hens run in small flocks give the best results, but these small flocks entail a vast amount of labour in attendance and a much larger expenditure in construction and maintenance than is the case with flocks of from one to five hundred.

By building a better class of house with provision for scratching material almost equal results can be obtained, and there is no question of its superiority.

Laying Shed.

One of the best houses for the purpose of keeping a large flock of layers is that in use on the Werribee Research Farm. This house is 120 feet long by 20 feet wide, 9 feet high in front and 7 feet at the back, which gives a capacity for 570 birds. It is constructed of iron, and faces the east. It is divided into two parts by a wire-netting passage 6 feet wide, which gives access to the yard in front of the building. In this passage are two doors, one leading into each half of the house. This passage also serves the purpose of a catching pen;



Laying Shed.

when birds are to be caught for culling or removal they can be driven into it and there caught much more quickly than in the house.

The back or western wall of the house has eight windows and four louvre ventilators placed at regular intervals. The front is closed in 2 feet up at the bottom and 1 foot down from the top; the remainder is covered with wire netting.

A piece of 4-inch galvanized-iron spouting is fixed along the front 1 foot from the ground, and serves the purpose of a drinking trough. Holes 4 inches by 2 inches are cut in the iron at intervals to enable the birds to put their heads through and drink; a board cover is hinged above the trough to protect the water from the sun's rays. The water is laid on and a plug provided at the opposite end to the tap for the convenience of cleaning. Above this trough is another at a height of 2 ft. 6 in. from the ground extending the full length of the house; this serves the purpose of a feed trough.

A 2-inch x 1-inch batten is fixed inside at a convenient height for the birds to fly on to a stand while feeding; pieces of hoop-iron are spaced 2 inches apart to enable the birds to put their heads through to feed.

With these conveniences, the feeding and watering of between five and six hundred birds can be accomplished in a few moments.

The nests made from kerosene tins are fixed along the back wall about 2 ft. 6 in. from the ground, and this enables the attendant to gather the eggs quickly and easily.

Four rows of perches are provided, and are made from 3-inch x 2-inch hardwood with the corners planed off; these are suspended from the roof by rods of iron three-eighths of an inch in diameter. The perches are placed 3 feet from the ground and 14 inches apart. The dropping boards are hung 14 inches underneath. The perches are hung 4 ft. 6 in. from the back of the house, which allows an ample passage for the egg collector and for cleaning the dropping boards. Several dust baths 3 feet square and 15 inches deep are provided.

This style of house can be thoroughly recommended, and the size may be adapted to suit requirements.

Breeding Pens.

Breeding Pen.

The breeding pen should have an outside run, as birds kept too closely confined produce a great many infertile eggs.

The breeding pens at the Werribee Farm can be recommended as models. They are 60 feet long and 12 feet wide, with a house at one end. The houses are built to serve two yards, and are 16 feet wide by 6 feet deep, 6 feet high in front and 5 feet at the back, divided in the centre by wire netting. Each yard has a house 8 feet by 6 feet; this allows 1 ft. 4 in. for the nest boxes (which are built to open from outside, so that the attendant may gather the eggs without entering the yard) and 2 ft. 6 in. for a gate to each yard.

Gates.

All gates should be at least 2 ft. 6 in. wide, so that a wheelbarrow may pass through when necessary.

Half of the front of each house is closed in and boarded up 12 inches so as to confine the scratching material to the house and prevent waste. A dust bath is provided, and there is room for five nest tins in the laying portion. Water is provided in a half-round

earthenware pipe running the full length of the yards on the outside; it is set level, 1 foot from the ground, and a tap at one end is provided; holes are cut in the netting at intervals for the birds to put their heads through and drink. A board cover should be placed over the trough to protect the water from the sun.

When building permanent yards of this description, it is very necessary to make provision for keeping the soil in good sanitary condition. This can be done by occasional dressings of lime, and by breaking up the surface of the ground to a depth of 2 or 3 inches. To do this with the least labour, a horse and small cultivator should be used.

When erecting the fences in rows of yards similar to those at Werribee, portion of the fence at both ends of each yard should be made of 3 inch by 1 inch battens, 7 feet wide and 6 feet high. These can be held in position by wire pins, and may be easily removed to

Brooder House.

permit a horse and cultivator to pass through. With all the hurdles removed, there is a clear passage from one end of the pens to the other, and the cultivator can be driven up one pen and down the next, and finally the passages cultivated the same as headlands in a field. The twenty-four yards at Werribee can be done in under three hours, whereas the digging of them would probably take three days.

Brooder House.

Where it is intended to rear a large number of chickens, a brooder house is necessary, and any building required for this purpose should, in victoria, face the north. The reason for this is that the best time to carry out breeding operations is during the months of July, August, and September. At this time of the year, not only the nights, but many of the days, are very cold, and it is desirable to get as

much sunlight into the house as possible. With the building facing the north and the windows built-in low down, it is possible to get the sun on the floor during the greater part of the day in fine weather, whereas, if the building faced east, the interior would not get any sun after about eleven o'clock in the day.

One of the best brooder houses I have seen is that in use at Werribee. This house is 60 feet long, 15 feet wide, 7 feet high in front and 8 ft. 6 in. at the back. It has twenty windows let in the front wall 1 foot from the ground, and five windows in the back wall close to the roof; these windows are 3 feet by 2 feet. As the pitch of the roof is from the back to the front, the fresh air comes in at the windows in the front, but above the chickens, and the bad air is drawn off by the windows at the back near the roof.

This house is partitioned off into five rooms and will accommodate 2,000 chickens. In front there is a yard 35 feet long, which can be subdivided by temporary hurdles and the chickens given a run on the grass when the weather is fine.

It is very necessary to keep the soil in this yard in good sanitary condition. After each breeding season it is sprinkled with lime, ploughed in, and allowed to sweeten by exposure to the sun and air till midwinter, when it is sown with rye grass; the growth of this not only helps to purify the soil, but provides a nice green pick for the chickens in the spring.

WEEDS AND THEIR ERADICATION.

(Continued from page 31.)

By H. W. Davey, F.E.S., Orchard Supervision Branch, Department of Agriculture.

Wild Sage, *Salvia Verbenaca,* L. Family: *Labiatæ.*

Although wild sage, which is a native of Europe, has been found a pest in parts of Victoria the family to which it belongs, *Labiatæ,* contains some of our most useful plants; many of them are fragrant and aromatic, such as lavender, peppermint, thyme, marjoram, and sage. Some species of sage (Salvia) are also cultivated for the beauty of their flowers, the well-known Bonfire Salvia being a familiar and much admired example.

Wild sage has oblong blunt leaves, wavy at the edge and crenate. Like the garden sage, it is an aromatic herbaceous plant, usually growing from 1 to 2 feet in height, and in the flowering season it is made conspicuous by its long spikes of small purple-blue blossoms. The leaves are few in number, and are widely spaced on the stems of the plant (Fig. 53).

Wild sage is a useless species, and is already a proclaimed plant in the Wimmera and Warrnambool shires. It has a wide distribution in Victoria, and is now to be found growing over a wide range of soil, varying in quality from that of good to that of very poor.

Fig. 53.—Wild Sage, *Salvia verbenaca.*
(Oct., 1922.)

The plant should be hand-pulled and burnt before it ripens its numerous seeds. It can easily be suppressed by cultivation in spite of its perennial nature.

Wood Sorrel or Soursob,
Oxalis cernua, Thunb.
Family: *Oxalidaceæ.*

The wood-sorrels were probably introduced into Victoria for ornamental purposes, but these plants, like many other unconsidered introductions, have, owing to our favorable climate, got out of hand and have now become pest weeds.

Oxalis cernua (Fig. 54), which is native to South Africa, is a bulbous plant having conspicuous yellow flowers. It will grow in almost any part of the State, but thrives best in shady situations and acid soils.

Besides bearing numerous seeds, the wood-sorrels are able to increase rapidly by means of their bulblets. Owing to the plant's perennial nature, it is sometimes hard to get rid of, and often becomes a great nuisance in gardens, and if left undisturbed will take entire possession of them.

Digging out the plants and burning them, followed by cultivations, will complete the eradication of this undesirable. As it favours acid soils, a lime application at the rate of from 7 to 10 cwt. per acre, which would tend to correct the soil acidity, would make conditions less congenial for it. If the acidity is due to lack of drainage, this defect

should be corrected, otherwise lime applications would be of little use.

Creeping Buttercup, *Ranunculus repens,* L. Family : *Ranunculaceæ.*

This useless perennial weed is one difficult to get rid of on account of its extensive stolons forming roots at the nodes, from which fresh plants make their appearance (Fig. 55).

Fig. 54.—Soursob, *Oxalis cernua* Thunb. **Inset—Bulblets removed from plant.**
(Specimen obtained October, 1922.)

Creeping Buttercup delights in rich moist soils, and in such situations can easily become most troublesome, especially so on river frontages, where it may occupy a very considerable amount of room and crowd out grasses in a very short space of time (Fig. 56).

Its leaves are three-parted, with hairs on veins and petioles; the terminal segment of leaf is provided with a short footstalk, and the

whole leaf is of an irregular-toothed outline. It grows from 12 inches to about 20 inches high. Its bright yellow flowers, each of which is capable of producing numerous seeds, are of the usual buttercup type, and are nearly an inch wide. The stalks are channeled.

The flowering period is during the spring months, and in Victoria this is usually finished by the end of October, after which time the plant concentrates its energies in throwing out numerous underground runners.

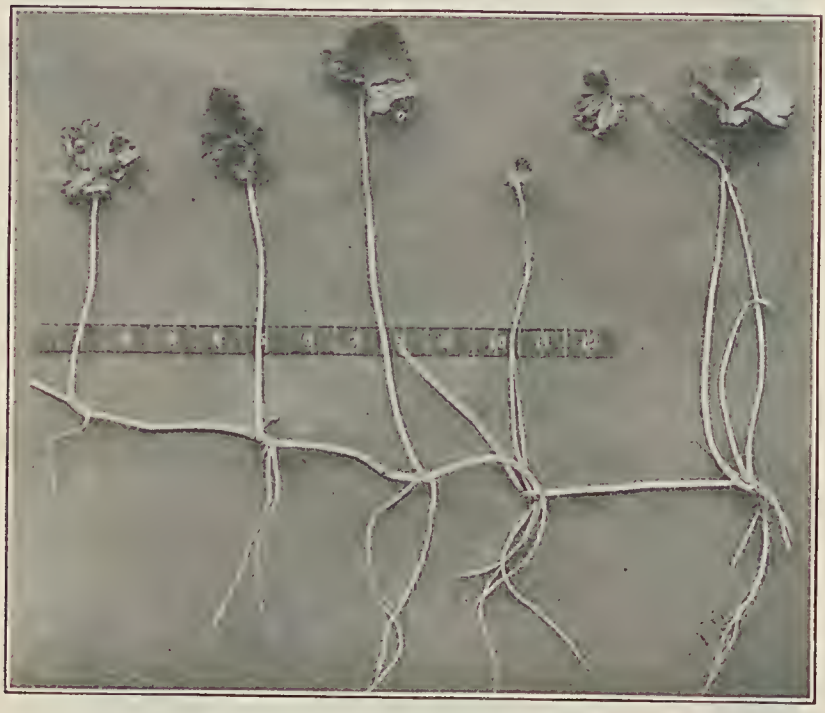


Fig. 55.—Creeping Buttercup, *Ranunculus repens* L. Showing young plants arising from underground runners.

As soon as any plants of this species are discovered they should be destroyed by being carefully dug out and burnt before the seed has ripened.

Creeping Buttercup, by means of its numerous seeds and runners, can easily become a serious pest. Although it favours moist situations, it is able to live through long dry periods during the summer months, becoming again actively aggressive when the winter rains set in.

The genus *Ranunculus* is an extensive one, containing a great many species, many of which are acrid, caustic, or even poisonous.

R. repens, a native of England, although ornamental, is a useless species. Good cultivation will be found to be effective against this plant when it occurs over large areas, but if growing in small patches it should be dug out and burnt.

Owing to the number of species of pest plants that have been allowed to thoroughly establish themselves in this country, farming might now be called a warfare against weeds, for unless they are kept

Plant of Creeping Buttercup, *Ranunculus repens* **L.**
(Specimen obtained October, 1922.)

under control, they are capable of seriously limiting the growth of crops or grasses, as well as increasing the cost of the labour involved in the growing of clean crops.

(*To be continued.*)

LEGUMES AND THEIR NITROGEN CONTENT.

There is, unfortunately, an impression among farmers that if the leguminous crop is removed from the land and the roots with their nodules remain, the soil is thereby enriched in nitrogen. It must be clearly understood, however, that the nitrogen taken from the air by the organisms does not exist in the nodules, but is made use of and distributed throughout the plant, and that the removal of the above-ground portion of the plant from the land means the removal of a large amount of nitrogen. An increase in the nitrogen content of the soil can only result from the growing of leguminous crops when they are either fed off, ploughed in, or soiled to stock and the resultant manure from the stock returned to the soil.—*Agricultural Gazette of New South Wales,* December, 1922.

POTATO EXPERIMENTS, WERRIBEE.

August to December, 1922.

By J. T. Ramsay, Potato Expert.

Last season various potato experiments were carried out on the farm of Mr. G. Barker, of Werribee, and the results are given hereunder.

The trials were conducted under irrigation and included—

I. Variations in manuring.
II. Immature *v.* ripe seed.
III. Variety tests.
IV. Selected seed *v.* unselected.
V. Seed from various districts.
VI. Pairing the rows for irrigation *v.* planting at equal widths.

Planting took place on 7th August, 1922, and a start with harvesting was made in the third week of December.

The season was not favorable for growth owing to the prevalence of strong cold winds. Practically no rain of any consequence to the crop fell during the growing period, so that the results obtained are almost entirely the production from water artificially applied.

The following tables indicate the variations in seed, manures, or treatment together with weights per acre yielded:—

Manure Trial.

Plot.	Fertilizer per acre.	Yield.	Increase.
		tons cwt.	tons cwt.
1	No manure	3 7	..
2	5 cwt. superphosphate	4 0	0 13 or 19 %
3	10 cwt. superphosphate	6 9	3 2 or 92 %
4	5 cwt. super. and 1 cwt. ammon. sulp. ..	5 4	1 17 or 55 %
5	10 cwt. super. and 2 cwt. ammon. sulp. ..	6 9	3 2 or 92 %
6	10 cwt. basic super.	6 0	2 13 or 79 %
7	5 market garden	4 6	0 19 or 28 %

While there is nothing sensational in any of these weights per acre, an important point is the fact that there is a constant increase in every case where manure was applied, and the substantial nature of these increases is shown in relief when expressed in percentages.

Another form of showing the benefits accruing from the use of artificial fertilizers is illustrated in the following table giving the values per acre of the crop from the various manures. The rates are calculated on a value of £8 per ton, which is a fair average of the prices ruling at the time the crop was harvested. The cost of manures is also tabulated, together with the cash increase after deducting manure costs:—

Plot.	Value of Crop per acre.	Cost of Manure per acre.	Net Cash Increase per acre.
	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*
1	26 16 0	Nil	Nil
2	32 0 0	1 7 6	3 17 6
3	51 12 0	2 15 0	22 1 0
4	41 12 0	2 5 6	12 10 6
5	51 12 0	4 11 0	20 5 0
6	48 0 0	2 12 6	18 11 6
7	34 8 0	2 0 0	5 12 0

There has to be taken into consideration, of course, the fact that in the case of the heavier yields the cost of digging, bagging, &c., would be greater than in the lighter yields, but these extra charges can easily be borne and still leave substantial percentage profits.

Consideration must also be given to the fact that the gain from manures is not exhausted by the crop to which it is applied.

Last year's manure trials at Werribee gave substantially the same results as this season. The land occupied by the potatoes in the season 1921-22 was sown in October with lucerne without further manures being applied. A good strike all over was secured, but the growths on the various sections occupied by the manure plots on the preceding crop of potatoes were noticeably different—vastly superior stands of lucerne being obtained on the sections treated with manure.

Water Supply Channel, Werribee.

It would be most interesting to follow this out by weighing the season's lucerne production on each and noting the differences in yields.

In the test of immature *v.* ripe seed, the source of supply of the two classes of seed was the same, the result given below being produced. In view of the fact that the superiority of immature seed has been demonstrated times out of number, it is remarkable that the practice of using it has not yet, here, come into general vogue.

Immature v. Ripe Seed.

	Tons cwt.	Value at £8 per ton.
Immature Seed	4 9	£35 12 0
Ripe Seed	2 14	£21 12 0
Increase per acre in Immature ..	1 15 or 64 %	£14 0 0 per acre.

This result requires no further comment.

Several varieties were tested under similar conditions. The tonnage of each are given herewith:—

	Tons	Cwt.	0	0 per acre.
Carman III.	7	11	0	0
Carman I.	6	16	0	0
Red Ohio	5	3	0	0
Delaware	7	1	0	0
American Wonder ..	4	5	0	0

General View of Potatoes Growing under Irrigation.

The importance of selecting seed from heavy bearing plants is illustrated in the following table:—

Seed Selected and Unselected.

Class of Seed.	Yield per acre.	Comparative Ratios.
	tons cwt.	
From plants producing seven and over	4 9	100
From run of plants	3 13	80
From plants producing three and under	2 1	46
From seed with weak shoots	1 2	24

A test was made of seed from various districts with the object of getting some light thrown on the question of change of seed. It is the contention of many that seed from districts of high altitude is

Irrigating Potatoes.

Types of Top Growths.

Plants from unselected seed on the left and from selected seed on the right.

superior to that from districts near the sea level. The accompanying result is given. The variety used in every case was Carman I.:—

District.	Yield.
	tons cwt.
Romsey (high level)	7 11
Catani (Koo-wee-rup Swamp)	6 16
Trafalgar Swamp	5 15
Woodend (high level)	4 17

This result is not submitted as being conclusive. My strong opinion is that it is of greater importance to pay attention to the strength of the stock from which seed is secured than to the district from which it is obtained.

It was suggested by some growers that the ordinary method of planting the sets in rows from 28 to 30 inches apart could be improved on by "pairing" the rows, *i.e.*, planting two rows close together, then leaving a wide space between these and the next pair for irrigating and cultivating. These two variations in planting were tried with the following result:—

Method of Planting.	Yield.			Marketable.
	Large.	Small.	Gross.	
	t. c. q. lbs.	t. c. q. lbs.	t. c. q. lbs.	per cent.
Rows paired	3 18 3 0	1 2 2 0	5 1 1 0	78
Rows equidistant	4 16 3 20	0 10 0 14	5 7 0 6	90

The same number of rows per chain width were worked into this plot. It will be noted that while there was but little difference in the gross yields from these spacings, there was a marked increase in the percentage of marketable tubers in favour of the rows planted equidistant at approximately 30 inches, amounting to 18 cwt. per acre.

With regard to the smaller tonnages per acre obtained in the sections devoted to testing the values of selection and immature seed, it is pointed out that these sections were sown with seed saved from the Werribee plot last year. Being harvested in early January, 1922, this seed was much further advanced at the date of planting than the seed from other later districts. The Werribee-saved seed made growth, consequently, much more rapidly than any other, and that very fact was the crop's downfall, as it suffered tremendously from the heavy wind storm of the 14th October, from which it never really recovered. Seed from other districts growing alongside escaped this gale by having considerably smaller haulms at that date.

An outstanding lesson to be gained from the two years' potato trials at Werribee under irrigation conditions is the paramount importance of being able to *follow irrigations of the crop very closely and thoroughly with cultivation.* That means that a grower should only plant under potatoes in an irrigation district such an area as he will be able to attend to without straining his farm working strength.

FRUIT INDUSTRY OF VICTORIA.

Its Present Status and Future Outlook from a Commercial Stand-point.

(Continued from page 3.)

Part II.

By E. Meeking, Senior Fruit Inspector.

Before reviewing the industry from the various stand-points mentioned, in the order indicated, a better appreciation will be gained by a statement of the development of the industry generally for the nine years 1912-13 to 1920-21. This includes the war period, and two years prior to the commencement of hostilities and two years after the signing of the armistice. To give a proper estimate of the relative increase or decrease in the acreage and quantities produced for the various kinds of fruit, and also the relative proportions of these in relation to the Commonwealth total, the figures quoted hereunder have been compiled on the basis of the average acreage and quantities produced for each season during the whole of the nine-year period:—

Fruit.	Average Acreage for Victoria.	Percentage of State Acreage to Commonwealth Total.	Percentage of each kind of Fruit to State Acreage (all Fruits).	Percentage. Increase or Decrease.	Average Quantities produced in Victoria.	Percentage of Commonwealth. Total of Fruit produced in Victoria.	Percentage of each kind of Fruit to State's Total production (all Fruits).	Percentage. Increase or Decrease.
					bushels.			
Apples ..	19,881	31·27	27·67	6·5	1,569,095	32·09	27·78	— 5·3
Apricots ..	4,110	46·93	5·72	3·	216,521	38·96	3·83	— 42·3
Cherries ..	3,282	57·78	4·56	14·2	93,400	45·92	1·65	— 61·9
Figs ..	427	39·24	·59	13·5	22,318	25·26	·39	— 6·4
Grapes (table)	2,236	29·59	3·11	—11·2	148,425	27·43	2·63	— 7·5
Grapes (drying)	13,254	57·89	18·44	54·7	1,939,933	65·13	34·35	11·6
Lemons ..	834	19·14	1·16	39·7	66,904	17·84	1·18	16·
Nectarines ..	170	35·49	·23	82·8	10,878	43·99	·19	47·
Oranges ..	3,653	15·35	5·08	79·3	88,511	4·84	1·56	39·2
Peaches ..	7,048	37·9	9·81	22·	523,273	39·37	9·26	44·7
Pears ..	8,250	60·41	11·48	24·1	607,262	54·24	10·75	27·4
Plums ..	3,445	42·53	4·79	4·7	252,423	42·51	4·47	— 15·8
Passion Fruit	210	85·71	·29	50·	10,549	16·28	·18	60·2
Quinces ..	992	57·4	1·38	20·2	74,350	46·81	1·3	9·6
Raspberries }	..	..	..	..	12,761	13·14	·22	—100·9
Strawberries }	4,050	38·38	5·63	6·1	10,560	41·83	·18	— 15·3
All Other }	..	..	..	..	..	..	..	..
Totals ..	71,842	35·	..	18·7	5,647,163	32·39	..	4·8

Note.—Minus sign thus — indicates decrease.

This table has been compiled by adding the figures for the whole nine seasons, dividing these by nine, and taking the percentage increase

or decrease of these figures as against the figures for the first season of the period.

The outstanding feature of these figures is the fact that, whilst the average increase of the Victorian acreage has been 18.7 per cent., the average increase in quantities produced in the State amounts to only 4.8 per cent. This indicates that the major portion of the increased area consists of newly planted orchards, which have not yet come into bearing. A study of the different varieties of fruit shows that this discrepancy between the increase or decrease in area and the increase or decrease in quantities is most marked in the following:—

Fruit.	Average Acreage, per cent. Increase.	Average Quantities, per cent. Increase.
Apples	6.5	—5.3
Apricots	3.0	—42.3
Cherries	14.2	—61.9
Lemons	39.7	16.0
Oranges	79.3	39.2

All these show that the areas planted have increased in greater ratio that the quantities produced. In the case of peaches, however, it will be noticed that, whilst the area has increased only 24.1 per cent., the quantities produced have increased 44.7 per cent., indicating that, although the area under peaches has increased, the increase has taken place in the first years of the period named, and that during the last few years peach-planting is not so popular as formerly. As will be shown later, it is, perhaps, as well that this should be so.

Taking the table generally, it would appear that within the next few years, the greatest increase will be in citrus fruits, and grapes for drying purposes. This will entail corresponding expansion in the marketing and distributing side, so that the increased production may be successfully met.

Dealing firstly with the local trade, it may be stated, generally, that its future development depends upon (*a*) production, distribution, and marketing costs; (*b*) facilities for readily and expeditiously reaching the consumer; and (c) the wholesale and retail prices.

Taking these factors seriatim: Details will be given in the next number of the *Journal* of (*a*) pre-war and present costs of establishing and maintaining a 20-acre orchard; (*b*) rail freights; (*c*) local distribution costs in the metropolitan markets. In addition to the foregoing, an outline of the facilities which exist in the metropolitan market for sale and distribution of fruit, as against the present facilities in this regard, will be given.

(*To be continued.*)

SCIENTIFIC WHEAT-GROWING.

RESULTS OF OFFICIAL TESTS.

Variety Tests in the Mallee.

Victorian farmers are keenly alive to growing only those wheat varieties which yield heaviest. The superiority of the Farrer crossbred, Federation, and the rapidity with which it swept all before it when introduced sixteen or seventeen years ago, will not readily be forgotten. The displacement of the old varieties by the brown-headed Federation was so complete that in a short space of time the characteristic golden-yellow colour of the harvest fields in the north was changed to bronze. Incidentally, an extra £250,000 was annually placed in the pockets of the farmers.

Since that time numerous attempts have been made to better Federation, but it constituted so great an advance that the task has not been easy. However, Mr. Pye has succeeded in evolving a variety, "Major," which has in its turn outed Federation from the east part of the Goulburn Valley, and the Department of Agriculture has evolved wheats which are attacking the Federation stronghold of the Wimmera and Mallee. Gallipoli is a new crossbred wheat bred at the Research Farm, Werribee, which has given a good account of itself in the Wimmera. It is prolific, short-strawed, and very hardy, but is rather tough in threshing.

Careful tests of new varieties have been made in the new Mallee districts. One experimental field is conducted by the Agricultural Department on the farm of Mr. P. G. Stewart, M.H.R., at Carwarp, in the Mallee, near Mildura. For the period 1918-1921, Gallipoli headed the list with an average of 15.9 bushels per acre. Penny was next with 15.8, then follow Canberra (15.4) and Mac's White (15.3). The average yield of Federation over the same period was only 13.7 bushels per acre. During 1921 and 1922, additional new crossbreds have been tested alongside the standard varieties. So far they have proved superior. It will, however, require two or three years' further test to make certain of the results.

Details of Yields of Wheat at Carwarp, 1921-1922.

Wheat sown at the rate of 45 lbs. per acre, with 50 lbs. of superphosphate, on new land not fallowed. Plots each one acre in area.

	Yield. Bushels per acre. 1921.	1922.	Average for 2 years.
New crossbred—Indian E. x Telfords	13.0	12.2	12.6
" " Indian F. x Federation	12.0	13.0	12.5
Canberra	11.9	10.7	11.3
Mac's White	10.1	12.5	11.3
Gallipoli	9.5	11.2	10.4
Wannon	7.9	11.8	9.9
Currawa	7.8	10.7	9.3
Federation	8.6	9.9	9.3
Penny	6.9	10.0	8.5

The low yields are due to the fact that the wheat had to be sown on non-fallowed land, also that the seasons were very dry.

It will be noted that the new wheats are superior to standard varieties like Federation, Currawa, and Penny.

Trials of New Wheats at Willaura.

Tests for the purpose of determining the variety of wheat that would give the best results under Willaura conditions, and also the kind and quantity per acre of fertilizer most profitable to use there, were carried out by the Department of Agriculture last season on the farm of Mr. F. Lindon, at Willaura.

A new crossbred wheat, as yet unnamed, but designated No. 78A, was tested there for the first time. Previously it had done well elsewhere in the Western District. It has given the highest yield at Willaura.

Details of Results.

Plots, each ½ acre; sown 1st June, with wheat at the rate of 75 lbs. per acre, and with 1 cwt. of superphosphate, on fallowed land.

	Bushels per acre.
New Crossbred—No. 78A	26.1
Yandilla King	25.8
Cleveland	25.1
Federation	24.7
Turvey	24.4
Gallipoli	22.1
New Crossbred—No. 12	21.7

No. 78A is a cross between Stanley and Bob's wheat. It was originated at the Research Farm, Werribee. Further trial will be necessary at Willaura to ascertain its behaviour in comparison with standard varieties over a peiod of several years. Cleveland wheat was imported from New South Wales for trial. It does well there in the coastal districts.

Fertilizer Tests at Willaura.

Tests with manure were made with Major wheat sown on fallowed land in half-acre plots. The rate of seeding was 75 lbs. per acre, and the time of sowing similar to the variety tests.

Details of Results.

Wheat Manurial Tests—Willaura.

	Bushels per acre.		
	1921.	1922.	Average for 2 years.
Super., 2 cwt.	33.9	22.4	27.7
Super., 1 cwt.	28.7	19.8	24.2
Basic phosphate, 1 cwt.	23.8	21.6	22.7
Bone fertilizer, 1 cwt.	18.6	21.6	24.2
Lime, 10 cwt.	13.6	16.3	14.9
No manure	12.4	12.0	12.2
Super, 2 cwt.	33.9	22.4	27.7
Lime, 10 cwt.; and super., 1 cwt.	31.9	22.0	26.9
Local gypsum, 3 tons; and super., 1 cwt.	31.4	21.4	26.4
Lime, 10 cwt.; and super., 2 cwt.	29.4	23.4	26.4

The table demonstrates the superiority of superphosphate over the other manures tried, and indicates that heavier dressings of it than are

commonly used in the district give the best yields. Lime appears to have an influence on the yield when used with 1 cwt. of superphosphate, but not commensurate with the cost of the application. Local gypsum on this soil apparently has much the same influence as the lime. The cost of the local gypsum would be less than the lime. The soil is a sandy loam.

The relative amount of profit gained by the use of the various fertilizers, after paying the cost of the manure out of the increased crop, is set out below:—

Treatment.	Bushels per acre.				
	Yield 1922.	Increase due to manure.	Value of increase at 4s. bushel.	Cost of the manure.	Extra profit due to the use of the manure.
			s. d.	*s. d.*	*s. d.*
No manure ..	12.2	..	..	..	..
Super. 2 cwt. ..	27.7	15.5	62 0	11 6	50 6
Super. 1 cwt. ..	24.2	12.0	48 0	5 9	42 3
Basic phosphate, 1 cwt.	22.7	10.5	42 0	5 9	36 3
Bone fertilizer, 1 cwt.	16.4	4.2	16 9	8 6	8 3

In calculating the above table, very liberal allowance has been made for freight on the manure, and wheat has been assessed at a conservative price.

The table illustrates the splendid monetary return that superphosphate gives the wheat farmer in this district who uses it judiciously. Applications at the rate of 1 cwt. per acre have increased the yield by 12 bushels per acre, and resulted in an average increased profit of 42s. 9d. per acre as compared with wheat raised without manure. Where 2 cwt. of superphosphate was used the yield was increased by no less than 15.5 bushels per acre, and the profit has been enhanced by a further 8s. 3d. per acre, totalling 50s. 6d. in all. Other fertilizers, such as bone fertilizer, &c., gave a lesser profit.

The results show the remarkable potency of water soluble phosphatic manures, such as superphosphates, on these soils.

The power of the fertilizer is better understood when it is realized that the dressing at the rate of 2 cwt. of superphosphate per acre produced an increased crop which weighed more than four times as much, viz., 8½ cwt., as the fertilizer applied.

SUCCESSFUL SHEEP FARMING.

The following notes on the method of handling ewes and lambs at the Rutherglen State Farm are taken from a report by the manager of the Farm, Mr. P. B. O'Keefe:—

A flock of 400 cross-bred and 60 Border Leicester ewes was lambed down. In addition, we had 100 other adult sheep; thus 560 sheep, with 470 lambs, were carried on the farm. The actual area reserved exclusively for their grazing was 243 acres; but they also had the run of last season's stubble before it was fallowed, and of a further 200 acres fallowed during September and October.

When it is considered that the most successful graziers in the district estimate that the area of land required to carry a ewe and fatten her lamb is at the very least an acre and a half, we can claim that ours is a record in stock carrying. Some may argue that it is impossible to produce prime lambs under such stocking conditions, but our answer is that our lambing percentage was 102.5, and of the 410 cross-bred lambs, 322 were sold at 22s. per head for freezing. A further 61 sold at Newmarket realized 16s. 3d., leaving a tail of only 27. The proceeds from sale of lambs is therefore just on £400. We still have the price of wool to come, only the bagged wool being sold to date. The price obtained for this was 23d. per lb., which augurs well for a big wool cheque.

A few notes on the way the sheep were handled may be of interest. In July, 1920, the 200 acres of pasture on which the sheep graze was dressed with superphosphate at the rate of 1 cwt. per acre; and a further dressing, at the same rate, was given to 140 acres in May, 1922.

Lambing commenced on 26th June, 1922, the whole flock being grazed on such stubble paddocks as were available. Every couple of days before the ewes left camp in the early morning, the unlambed ewes were worked quietly away from those with lambs, and removed to another paddock. Those with young lambs were gradually bulked into the one flock for convenient handling and put on the best feed available—fresh stubble, young crops, or manured grass. They were always worked quietly from paddock to paddock well before night-fall, so that the lambs might be mothered before dark, and so protected from foxes.

When about 50 lambs were dropped, they were marked. This operation was carried out thus early so as to avoid any check in their growth, which might have occurred if marking had been delayed. As the number of lambs increased and grew, the demand for feed became more insistent, and about the end of July an attempt was made to supplement the pasture with hay chaff, but after wasting about 10 tons, which the sheep refused, the attempt was abandoned.

By the end of September the lambing was finished, and from then on the whole flock was removed regularly from one paddock to another of the five which carried them through. The shortest period for which they were grazed on the small paddocks was two days, and on the larger from five to seven days.

The heavy carrying was made possible by regular attention to the flock, frequent change of feed, good supply of pure water, licks of coarse

salt containing 2 per cent. of iron sulphate, and last, but by no means least, the top-dressing of the pastures. It is, perhaps, worthy of mention that the general impression is that the result of a superphosphate top-dressing is more marked under wet than dry conditions; therefore, its good effect was surely its minimum this season, with its deficient rainfall.

Crops.

In his report on the season's harvest, Mr. O'Keefe says:—

District yields generally were far in excess of the farmers' estimates, who were pessimistic owing to the heavy pre-harvest winds and dry scorching conditions during early summer, following on a year of very low rainfall. The total rain for the year was only 14.85 inches—the third lowest record for twenty-three years. The last useful fall was during October, which raised the total for that month to 1.83 inches, an amount quite insufficient to counteract the dry conditions both preceding and following that month.

The highest yield of wheat in the vicinity of the College was an average 25½ bushels per acre from an 80-acre field. The best hay crop was estimated to give 3½ tons to the acre. This was grown on a hillside, with a damp, easterly aspect. At the State Farm the hay crop of 200 acres, mostly following wheat and oats on fallow, yielded a total of 340 tons. Wheat for seed on fallow gave seven and a half bags to the acre, and that on early-ploughed land averaged five and a half bags. The oat crops on fallow yielded seven and a half bags per acre. Grading of seed has commenced, and it is expected that the last of the grain will be ready for distribution by the end of March.

Cultivation.

Two hundred acres were fallowed during September, half of which will be planted with wheat during the 1923 season, and the other half with oats. Sixty acres of that intended for wheat was badly infested with thistles. This was disced before they reached the flowering stage. We should thus be assured of a clean wheat crop. It is intended to break up two paddocks that are plough-sick, and plant them with Wimmera rye-grass and subterranean clover. They will be left two years in pasture, and then fallowed for wheat.

PIGS AND THEIR MANAGEMENT.*

We are in receipt of a copy of the fourth edition of Mr. H. W. Potts' book, "Pigs and Their Management." The fact that a fourth edition has been found necessary is ample proof of the popularity of

* Published by Angus and Robertson, Sydney. Price 12s. 6d.

the book with pig-breeders and feeders in Australia. It contains much valuable advice and information, and is specially written for the guidance of those engaged in the industry in Australia.

In speaking of the breeds suitable for this country, Mr. Potts says:—"We in Australia have not had such lengthened experience with the white pigs as with the Berkshires, but they are asserting a claim to pig-breeders' attention which is certain, in the long run, to challenge the Berkshire's claim to leading place. . . . . The English stud books prove that the large Yorkshire is the most fashionable. Large numbers are sent to the Continent as well as to Canada and North America. The flesh is sought by both butchers and packers, owing to its succulence and lean meaty character. One prominent packing firm in Canada pays 4s. to 5s. per 100 lbs. more for this breed than for any other. A series of tests conducted in the United States places the large Yorkshire breed first, in that it produced 100 lbs. of pork at a smaller cost than several prominent breeds tested at the same time. . . . . The most prominent merit in large Yorkshires is their power to make a good quality of lean bacon. . . . . The sows produce an average of eight to twelve suckers, and are careful mothers, and good milkers. The young grow quickly, and attain a good weight at an early age."

Victorian breeders and fatteners, with few exceptions, are not yet alive to the exceptional merits of the large Yorks, and many do not even know the difference between this and the Middle York breed which, though inclined to produce too big a percentage of fat, has become so popular in this country. The countries which lead in the production of high-class bacon for supply to the British market are Denmark, Ireland, and Canada, and it is the general use of the Large York boar on other well-bred sows which has enabled the fatteners of those countries to produce bacon commanding the highest price. The demand in England is the same as in this country, viz., a young, juicy, tender, mild cured bacon, with a big percentage of lean. The above-named countries have been able to meet the demand by the use of the Large York boars.

The United States of America is the biggest bacon producing country, approximately half the total number of pigs in the world being there. They are very large exporters of bacon, &c., to the British market, but this is of low grade, and sells for 1d. or more per lb. less than that of Denmark, Ireland, and Canada. According to a recent issue of the report of the Board of Agriculture and Fisheries, London, the United States Department of Agriculture is appointing a commission to investigate the business, as they find it advisable to improve the quality of their product. Further comment is needless.

On account of its mild climate, and other conditions, this country is better adapted to the production of bacon than any of the above-named countries, but our share of the trade so far is insignificant. The future should see an enormous development in the export trade of bacon to Britain. But first of all it is imperative that we should recognise the lines on which the industry must be developed if we are to compete successfully. In this we should benefit by the experience of those countries which have attained such high results.

LOTUS OR BIRD'S FOOT TREFOIL.

Of the Legumes, the Lotus, or bird's-foot trefoils, have not hitherto received much attention in Victoria. In common with clovers and medicks, they are introductions from the Old and New Worlds, for none of them is truly indigenous to Australia. They are easily recognised by their large yellow flowers and slender seed-pods spread out like the toes of a bird's foot.

The bird's-foot trefoils belong to the Lotus family of the botanical order *Leguminosa,* and of these there are several species here; some perennial, others annual. Among the former are *Lotus major v. uliginosus,* or greater bird's-foot trefoil, locally known as Beech Forest clover, which thrives in moist land and does not object to acid, peaty soils, and *Lotus corniculatus,* or lesser bird's-foot trefoil, which remains in flower all the summer, and shows a predilection for poor sandy hillsides.

Of the annuals, there are *Lotus tetragonolobus,* or winged pea, *Lotus hispidus,* or Boyd's clover, which will grow among bracken, and whose roots extract nourishment from the creeping roots of that fern. Then there is *Lotus augustissimus,* which is now being largely grown in the Auckland Province of New Zealand, where it accommodates itself to every variety of soil, and is reported there to give heavy yields of hay up to three tons per acre. Lastly there is *Lotus Australis,* which has been found in recent years, and which may possibly be a hybrid developed under Australian conditions of soil and climate. There is also a variety, which, so far, has not been met with here—*Lotus Americanus,* or Hosackia, commonly called Dakota vetch, which is largely used as a fodder plant in the north-west of the United States of America.

In France, where these trefoils are grown in the warm dry parts of the centre and south-west of that country, their culture has lately been ably and warmly advocated by Prof. M. E. Schribaux, of the School of Agronomy, Paris, and by M. Rabaté, Inspector of Agriculture. The climate of the centre and south-west of France in some respects resembles that of the moister parts of Victoria; it is wet in winter and dry in summer, and is a prolific neighbourhood for the bird's-foot trefoils.

The Lotus family does not object to undrained land, and where cultivated the different varieties can be relied on to give two cuts in the year, and a liberal aftermath. When mown for seed, they yield best on the second cut. Lotus will not bloat live-stock, and the hay is of a high quality. Lotus is remarkably free from any of the diseases such as violet rhizoctonia or downy mildew (*Peronospora trifoliorum*), and leaf-spot of *négril,* which ravage lucerne grown in some parts of France. Being leguminous, it forms nitrogenous nodules on the root system, and thereby increases the fertility of any soil and responds to phosphatic fertilizers. Its greatest advantage lies in the fact that it lasts indefinitely, and when once introduced it will be found to have come to stay. The plant is naturally not without defects, and these have been clearly summed up by Prof. Schribaux:—

1. It is liable to attacks of dodder, but this is negligible, because the dodder filaments are so fine that most farmers do not even notice them. However, it is possible to avoid this parasite by sowing clean seed from some reliable firm of seedsmen.

2. On fertile soil the stems of Lotus get laid very readily, and are not easily mown; but by growing it with cocksfoot, timothy, or prairie

grass, or even creeping bent grass, the stiff stems of these latter will support it.

3. The yellow flowers and the seed-heads are as a rule avoided by live stock, as are those of white clover, probably because both contain a cyano-genetic glucocide which, under the influence of a fermenting agent, or enzyme, becomes converted into glucose or grape sugar and hydrocyanic or prussic acid. This, however, is really an advantage, in that it allows the seeds to open and to reseed the paddock, and thus ensure the plants becoming more lasting on the ground.

4. The cost of the seed is its greatest drawback. The latest quotation in Melbourne is 4s. 6d. per lb., but the seed being very tiny, a relatively small amount is required to be sown. In France it is sown at the rate of 4 lbs. per acre. In New Zealand, locally-grown *Lotus major* is quoted at 2s. 7d. per lb. in Auckland, and *Lotus augustissimus* as low as 1s. per lb.

5. Lotus having been cultivated for comparatively few years, the seed is derived from quasi-wild plants, which furnish a rather variable return. However, by selection in future, better strains than those we have now will be obtained.

Prof. Schribaux advocates the sowing of the following mixtures:—On fair average fertile land of good rainfall, cocksfoot, tall oat grass, and Lotus, of each 6 lbs. per acre. On light soils in parts less moist, Lotus, 8 lbs.; tall oat grass, 8 lbs.; cocksfoot, 2 lbs.; Hungarian forage grass (*Bromus inermis*), 12 lbs. per acre.

In Victoria, Lotus will grow in practically all the moist districts, especially south of the Divide. It is readily started in a grass paddock at the time of top-dressing by sprinkling a handful of seed, either pure or mixed with other clovers, on top of each bag of phosphatic fertilizer as it goes into the manure-box of the drill. This may be done at any time of the year when work on the farm is lightest, for Lotus and clover seeds retain their vitality in the soil for a long while, and when the weather is most suitable they will germinate under the stimulus of a neutral or alkaline phosphatic state of the soil. Captain A. E. T. Payne, at Yarra View, has found *Lotus major* growing among rushes, and, in order to eat the Lotus, cattle have grazed down the rushes as well, and so kept the latter in check.

The existence in Lotus and white clover of a cyano-genetic glucocide and its attendant enzyme was discovered by a French observer, M. Mirande, in 1912. It appears mostly in wild specimens of these plants. Prof. Stapledon found that 118 samples of wild white clover all gave a positive reaction, whereas of 126 samples of commercial white clover only seventeen positive reactions were noted. It is an interesting fact that fourteen samples of New Zealand white clover all gave a positive reaction to the test, and of 51 samples from North America, all but one reacted positively. It has also been noticed that seed obtained from dense hoards in old and standing pastures is more likely to react positively than seed obtained from leys of one or two years' duration. This cyano-genetic glucocide resembles in some respects that found in sorghum or kaffir corn, the consumption of which at certain stages of growth leads to disastrous results when eaten by live-stock, on account of prussic acid poisoning. No ill effects, however, have ever been observed from the eating of any part of white clover or Lotus plants.

A MULE WITH A FOAL.

The mule is in almost all cases incapable of producing young. However, "the exception that proves the rule" is shown in the above illustration taken from an American paper. The owner of the mule is Mr. T. B. Neely, Illinois, U.S.A.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Young Trees.

Young trees of the Citrus family should now be making a good, thrifty growth. The foliage should be glossy, and its general appearance a bright green and healthy one. Occasional light waterings, as well as mulching of grass, or of well-rotted manure, will be helpful to the trees.

Young deciduous fruit trees will also benefit by having a grass or manure mulch; and, if it has not previously been attended to, unnecessary growths in the centre of the tree and on the main leaders should be removed.

Fumigation.

Evergreen trees, including those of the citrus family, that are infested with scale, should now be sprayed or fumigated to rid the trees of this pest. For spraying, a weak red oil emulsion, lime and sulphur

spray, or resin wash will be found useful. The most successful method, however, of dealing with the scale pest is by fumigation. The trees should be closely enveloped in an airtight sheet or tent, and hydrocyanic gas generated inside. The chemicals for generating the gas, as well as the fumes of the gas itself, are excessively dangerous, and great care is necessary in their manipulation. A wooden, enamel, or earthenware vessel is placed inside the tent, the vessel containing a mixture of 4 fluid ounces of sulphuric acid, and 12 fluid ounces of water, the acid being placed in the vessel first. Four ounces of cyanide of potassium is then quickly dropped into the vessel, the tent closed down at once, and the bottom of the tent all round covered with soil to prevent any of the gas escaping. The operator must take care that not the slightest portion of the fumes is breathed. Fumigation should be carried out at night-time or on a cloudy day, if the foliage of the trees be thoroughly dry.

The Vegetable Garden.

Celery crops will now be a prominent feature in the vegetable section. The seed may be sown from January to March, and succession plantings should be carried out occasionally during those months. The growth of celery should be quick; a fair supply of water and a good rich, loose soil are helpful to its growth.

Ample water will now be required in the vegetable garden. The surface should be kept well hoed, and mulchings of manure given wherever possible.

Cabbage, carrot, turnip, radish, lettuce, peas, cauliflower, &c., seeds may now all be sown, and young plants from any seed beds planted out.

The Flower Garden.

Constant watering and hoeing will now be required for successful gardening. Cannas will require manuring; the old flowering stem should be removed to make way for the new growths. Dahlias and chrysanthemums will need a great deal of attention, staking the growths as they develop, disbudding, thinning out weak shoots, and removing unnecessary growths. The dahlias should receive a good soaking of water during the hot weather, and liquid manure or quick acting fertilizers given when the flower buds are developing. When chrysanthemum buds are very small, liquid manure should be applied. Roses may now be summer pruned; all weak growths should be removed, and the strong ones shortened to a fairly good bud. The plants should then receive occasional waterings with liquid manure, and be kept well supplied with water.

All flowering trees and shrubs that have finished blooming should be pruned, the flowering growths removed, and, unless the seed is required, all seed heads cut off.

Cuttings of pelargoniums, zonale and regal, may now be planted, and delphinium spikes that have finished flowering cut down to make way for new growth, the plant being watered and manured. Seeds of perennial

and hardy annual plants, especially winter-flowering sweet peas, Iceland poppies, stocks, and pansies, may now be sown, and a few bulbs for early flowering planted. The beds should be well manured and deeply worked in anticipation of planting the main crop of bulbs.

REMINDERS FOR MARCH.

LIVE STOCK.

Horses.—Feed as advised last month. Those in poor condition should be "fed up" in anticipation of winter.

Should horses not be feeding well and salivating, examine mouth for grass seeds. Horses running at grass are frequently affected by them. The seeds should be removed, and a mild mouth wash used. A very weak solution of Condy's Fluid will answer the purpose.

Grass seeds also cause blindness if not removed from the eye, and the inflammation reduced by bathing the eye with boracic solution. A teaspoonful of boracic acid to a pint of boiling water is the correct strength for the purpose. Should a scum remain over the eye inject into the eye every other day a small quantity of the following solution:—Sulphate of zinc, 4 grains; water, 1 pint.

Cattle.—Cows in milk should have plenty of succulent fodder and water easy of access. When cows in milk have to be fed on chaff it should be soaked with about half its bulk in water from 12 to 24 hours and the necessary concentrates mixed in at time of feeding. This soaking will soften the grain in the chaff, preventing its loss in the droppings, and is the nearest substitute for the succulence so necessary. Algerian oats should be sown on suitable land for grazing off in the winter. Sow a mixture of oats, rye, and tares or peas for winter fodder or to fill silos. Only exceptional cows and those required for town milk supply should be served between now and July. Within the next two or three months is the best time for cows to calve, as they will pay to feed through the winter and give the best returns for the season, and be dried off when the grass is dry and scarce. Calves should be given lucerne hay or crushed oats where grass is not available. It will pay well to feed crushed oats to good cows.

Pigs.—Sows about to farrow should be provided with short bedding in well-ventilated sties. See that the pigs have shade, and water to wallow in. Pigs should be highly profitable now. Pollard should be used for very young pigs, and bran for suckling sows, and to help to prevent constipation.

Sheep.—All ewes should be kept strong for lambing. Crutch round tails and lessen accumulation of discharge, and consequent attraction to the fly pest at lambing time. Clear wool from round udders and teats and thereby save many a lamb in bad weather; especially is this necessary in the case of young ewes of the Merino and Lincoln crosses. Clear wool from eyes also. In crutching ewes when close to lambing lay them over carefully, grasp by the thigh low down, not by the flank as is generally done. Pure British breeds of ewes and very coarse cross-breds may still be only coming in season; rams should be left mated to make sure. Clean excessive wool and stains from ewes, and burr and stains from rams to ensure service. Reserve good paddocks for ewes with early-born lambs. Where possible, castrate ram lambs immediately. Good prices promise for mutton, and particularly for lamb.

Poultry.—Cull out the drones and get rid of surplus cockerels. Keep forward pullets well fed—eggs are rising in value. Repairs to houses should be done this month. Thoroughly cleanse all houses and pens. Spray ground and houses with a 5 per cent. solution of crude carbolic acid. This will act as a safeguard against chicken pox; burn all refuse and old feathers. Provide a

liberal supply of green food. For each moulting hen, add a teapsoonful of linseed to the morning mash. Use tonic in mash, which should be kept in cool shady spot.

BEE-KEEPING.

Since the end of November the season has been quite abnormal from the bee-keepers' point of view. Owing to frequent cold changes and southerly winds but little surplus honey has been stored from Yellow Box and Redgum, even in favoured localities, so that the total yield will be far short of what was expected.

Grey box, which is considered to be our most dependable honey tree, is well budded, but the flowering will apparently be late in some districts—too late to be of any use to bees, unless we have an exceptionally warm autumn.

During February bees commence to arrange their stores of honey and pollen in preparation for the coming winter, and it is therefore unwise to interfere with the combs in the brood chamber, to insert empty combs between the brood, or to change the position of the combs.

Where there is a surplus of honey in the upper story, it is best not to take the whole of it in one operation, but to take half, and when the emptied combs are filling up again take what was left. At this time of year bees will work better and keep on breeding longer with a full, or partly filled, super than with empty combs above the cluster of bees.

When there is a shortage of honey in February or March, it is best to give only enough sugar syrup to carry the bees through till April, but to give whatever amount is necessary in the shortest possible time. Feeding extending over many days will stimulate brood-rearing, and a few weeks later the bees will be short of food again, compelling further feeding.

In the case of colonies below the normal strength in the number of bees, continuous light feeding will do no harm; it will, on the contrary, be beneficial, as it increases the number of young bees, but the feeding for winter stores should be deferred till the middle of April, when but little of it will be used for brood rearing.

CULTIVATION.

Farm.—Work fallow where possible for autumn sowing of cereals. Sow winter fodder crops, such as rye, barley, and vetches. Prepare land for lucerne plots for autumn seeding. Make silage of maize and other crops for winter use.

Orchard.—Prepare new land for planting; plough deeply and subsoil; leave surface rough. Plant out strawberries after first rain. Plant crops for green manure. Continue to fight the Codlin Moth.

Vegetable Garden.—Prepare ground for winter crops. Plant out seedlings in moist soil. Sow cabbage, cauliflower, lettuce, early peas, swede turnip, beet, carrot, radish, and early onions.

Flower Garden.—Cultivate and water. Feed dahlias, chrysanthemums, and roses. Plant out shrubs, trees, and all kinds of bulbs. Sow hardy annuals. Plant geranium and pelargonium cuttings. Spray for Aphis, Red Spider, and Mildew.

Vineyard.—Select scions, if not done last month. In cooler districts, where ripening is difficult, it may be assisted by removing basal leaves only, as soon as berries change colour. This is the month for drying currants, sultanas, and gordos (Lexias and Clusters). Do not pick before grapes are properly ripe. For instructions for packing grapes for export, apply to Department. Shipments should be made in March and early April.

Cellars.—Vintage month. For light dry wines, pick as soon as grapes are ripe; do not wait for over-maturity, as is so often done. Pay attention to acidity; correct same if necessary with tartaric acid or late grapes. Acidimeter supplied by Department; price 6s. 6d. Sulphiting and the use of pure yeasts are strongly recommended, as they insure production of sound wine; further information supplied on application.

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WINTER FODDER CROPS

Somner's Special Mixtures

No. 1—Rye, Dun Peas, Golden Tares (Vetches), Barley or White Oats, mixed quantity, sufficient for 1 acre - 15/6

No. 2—Oats, Cape Barley, Golden Tares, Tick or Horse Beans, Partridge, Dun, or Blue Peas, mixed quantity, sufficient for 1 acre - - - - - - 18/6

Special price for large acreages.

Either of these mixtures, if cut or pastured in Winter and ploughed under in August, will make a good preparation for Lucerne to be sown in August or September.

The growing of Summer Fodder Crops imposes a tax on the resources of the soil, and as a restorative when ploughed in, the above mixtures are specially recommended. The crop comes away rapidly and makes steady headway during winter, giving a good quantity of excellent fodder.

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A Highly Nutritious and Palatable Green Feed. **Will fatten 3 more sheep per acre than any other kind. Will not taint the milk.** Sown now, it will catch the Autumn rains, and will be ready for pasturing in about 10 weeks. Sow 4 to 6 lbs. per acre in drills, or 8 to 12 lbs. broadcast. **1/3 lb.; 130/- cwt.**

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CLOVER

The Great Winter Fodder. Valuable for its green or dried fodder, and as a Winter soiling crop for Orchards, Vineyards, &c. At least four cuttings can be made during a season. Sow 8 to 12 lbs. per acre in drills, or 20 to 30 lbs. broadcast. **"Misskawi" Brand (imported direct), specially re-machine cleaned, 2/- lb.; 1/10 lb. in 14 lb. lots; 1/9 lb. in 28 lb. lots or more.**

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The following are specially recommended for present sowing:—

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Very heavy cropper; Good keeper, 3/6 lb.

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Red Poll Dairy Herd

The Department will shortly have completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter ***fat*** yielded.

(For Record of Yields of dams see Red Poll Herd Book.)

The Bulls in Use include—

LONGFORD MAJOR (Imported)

Dam's Record 14713 lbs. milk ... 6 years average 11338 lbs. milk
G. Dam's ,, 10548 ,, ... 4 ,, ,, 9135 ,,

BELLIGERENT (Imported)

Dam's Record (1st milking) 7144 lbs. milk.

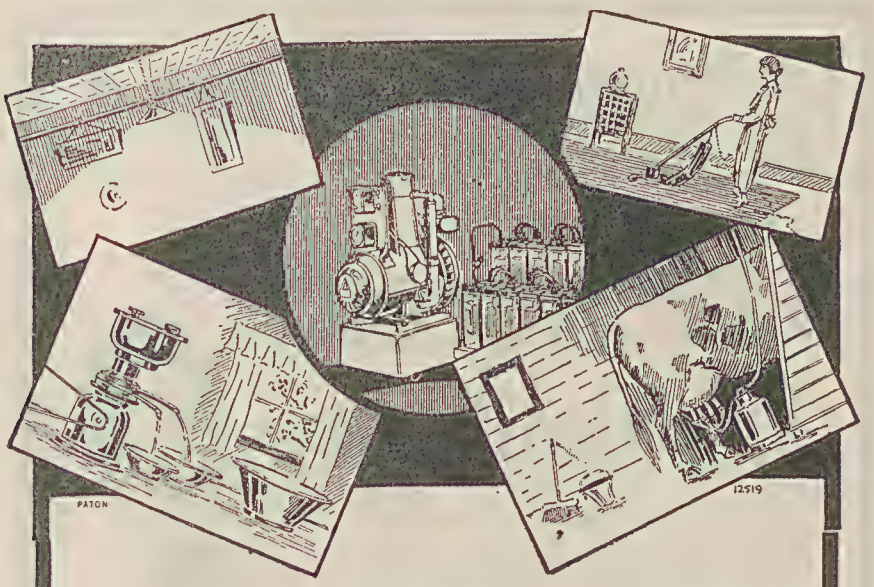
Dam's Dam's	,,	14533 lbs. milk	...	4 years	average	12871 lbs. milk	
Sire's Dam's	,,	10370	,,	... 7	,,	,, 9354	,,
Sire's D. Dam's	,,	9510	,,	... 12	,,	,, 8033	,,
G. Sire's D. Dam's	,,	10215	,,	... 7	,,	,, 9386	,,
G.G. Sire's D. Dam's	,,	12565	,,	... 10	,,	,, 8853	,,
G.G.G. Sire's D. Dam's	,,	10088	,,	... 2	,,	,, 9754	,,

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

Application for purchase to

Dr. S. S. CAMERON, DIRECTOR OF AGRICULTURE, MELBOURNE.



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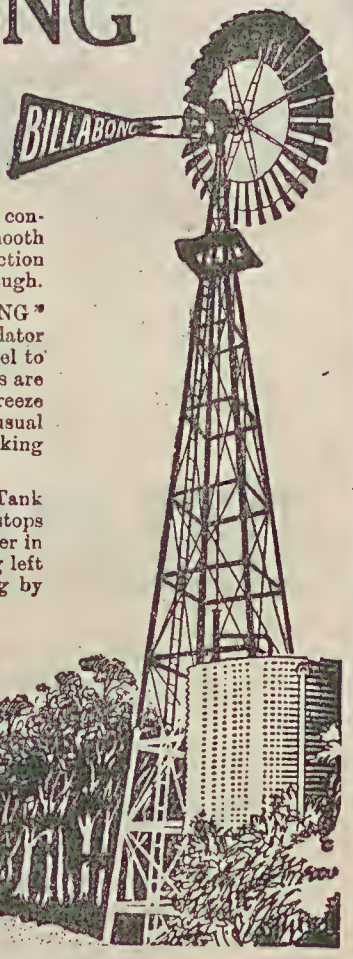

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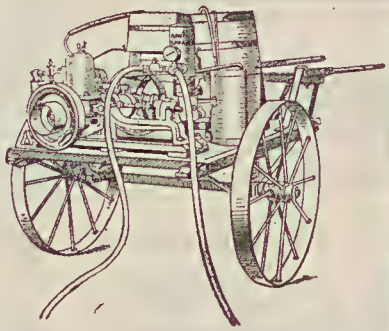

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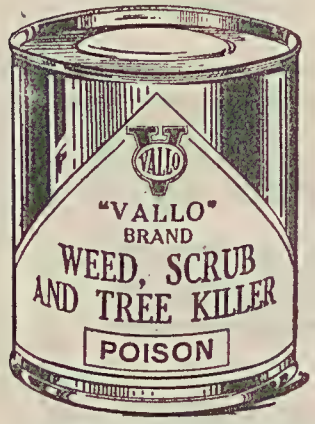

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Every square foot of ground is valuable now-a-days—far too valuable to be usurped by undesirable weeds and scrub. Why should they sap the vitality out of ground which should contribute to your storehouse or granary?

"VALLO" Brand Weed Scrub and Tree Killer

Is the speedy, sure, and economical means of cutting short their existence. "VALLO" is not an experiment. It is an absolute exterminator of any and every kind of noxious growth. Whether your trouble be giant trees or common sorrel, put "VALLO" on the job and you'll be impressed by what it can do.

PRICES—56 lbs., 70/-; 15 lbs., 21/3;
7 lbs., 10/6; 1 lb., 2/-; ¼ lb., 1/3

Manufactured by

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FOR TOP PRICES——CONSIGN YOUR

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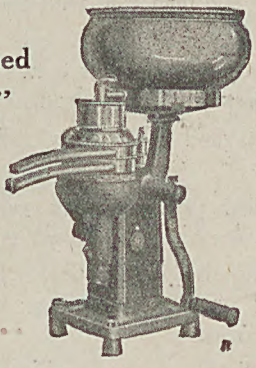

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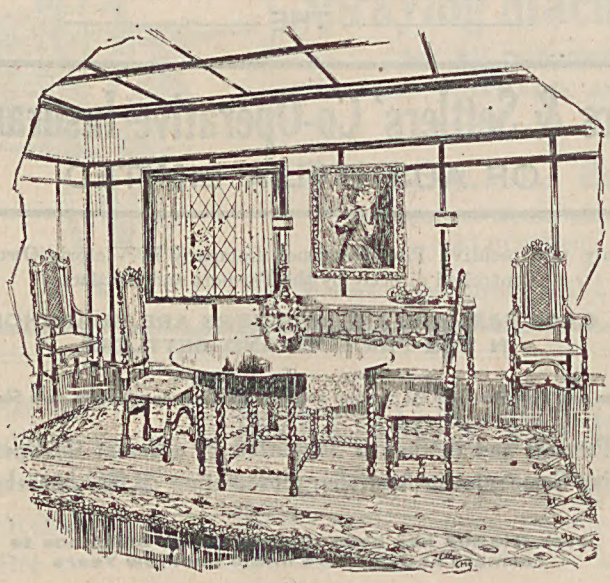

"Adamo" Wall Board

The ideal lining board for walls and ceilings

Very tough and rigid—is not brittle; can be transported long distances without breaking, and easily sawn.

Easily fixed in position—one man can, with ease, handle a sheet 10 ft. x 4 ft.

Readily nailed without cracking, and is a non-conductor of heat and cold; also fire-retardent. It deadens sound.

A resistant of white ants and other pests. Rats and mice do not attack it.

Very light, being 6¼ lbs. to the square yard, and does not bulge or warp with sea air or mountain mist.

Will take any paint and also Wall-paper. In short, the most artistic Wall Board, suitable for ceilings, partitions, or wall-panelling for inside work.

Manufactured in Australia by Australians from Australian wood pulp.

Particulars from

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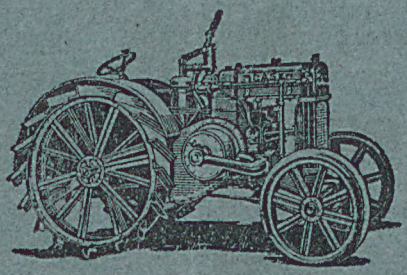

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***POWER* is the one big factor within the farmer's control that determines the productivity of the soil**

There are many different ways in which the farmer may profit by the use of a Case Tractor:

Quicker harvesting.

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Better farming by quicker ploughing and more intensive working of the land.

More timely ploughing and preparation of the seed bed.

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Contract work done after the farmer's own work is finished often brings in enough cash to pay for a Case Tractor in a few years. Release of land for stock raising.

The Case Tractor shows a saving of from one-third to one-half in every farm operation usually performed by horses.

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